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Ideas
about Teaching
and Learning
Volume 7, Number 5
December 1976

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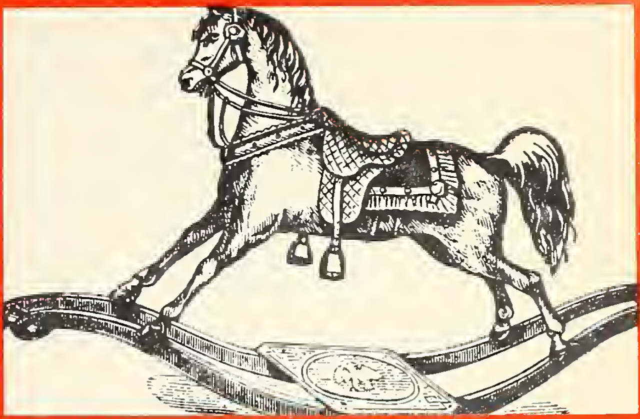

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Vol. 7/No. 5/December 1976
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ORBIT 35

Elementary Science in Ontario – A survey of the past fifteen years — R. H. Stinson — 3
Reading Help for New Canadians — Sonja Gazan and Robert MacIntyre — 9
Why don't they learn to write? — Priscilla Galloway — 10
Hydroponic Gardening – Classroom Learning — Helmut Julinot — 12
Reading in the Kindergarten — Isabell Carter — 15
'Not Another Meeting!' — Len Chellew and Vern Trott — 16
Une Recherche empirique chez les élèves franco-ontariens — Dormer Ellis et Jacques Beauchemin — 21
Of Many Things — 23
Teaching Aids from the Community – Manitoba — 27
Profile of a School 37/Bloomingdale Public School — 28

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A survey of the past fifteen years

ELEMENTARY SCIENCE IN ONTARIO

R. H. Stinson
OISE Western Ontario Centre, London

This review is mainly about the work of the Science Committee of the Ontario Curriculum Institute, of which I was a member and for a period chairman. Although our work gave us a pretty good view of elementary science development in Ontario, it is still a limited view. I am sure that among the many others who participated in the development there will be other views, some perhaps quite different from mine.

In 1963 we began an experiment in Ontario to take a fresh look at the way elementary science was being taught in the schools. This was part of a worldwide movement in curriculum revision in the 1960s, which in different countries brought together scholars and teachers in productive combinations to examine the content of the curriculum and the way in which modern science was being presented in the classroom. For example, a major curriculum development project in the United States, where groups were trying out innovations in secondary school classrooms in physics, chemistry, and biology, eventually resulted in such courses as PSSC physics, CHEM Study, and the different versions of the Biological Sciences Curriculum Study. At the same time both in Great Britain and the United States major attention was being given to the teaching of science in lower levels of the schools.

Ontario Curriculum Institute

In Ontario the movement received its impetus from the work of a joint committee of the Toronto Board of Education and the University of Toronto. During the summer of 1961 this committee divided into three groups—an English Study Committee, a Social Sciences Study Committee, and a Science Study Committee — and from the summer work published a book in 1962 called *Design for Learning,* edited by Northrop Frye.[1] The Science Study Committee examined the courses of study from kindergarten to grade 13 and made a number of constructive criticisms and comments, ending up with a table of suggested topics in both physical and biological sciences that might be taught at appropriate age levels from grades 1 to 10.

From this beginning grew the Ontario Curriculum Institute (OCI), with funding from the Ontario Teachers' Federation and the Department of Education and with substantial support from the Ford Foundation, the school boards, universities, and other educational institutions of Ontario. For the next three years OCI organized and provided support and funds for the ongoing work of committees not only in the original three areas of English, social studies, and science, but in a number of other curriculum areas too.

The OCI Science Committee began its work in the summer of 1963. Its membership included representatives from the primary to the university levels, as well as from the teachers' colleges and an institute of technology. During the first summer we reviewed the material already prepared in *Design for Learning,* attempted to understand each other's point of view, looked at the current situation, and visited innovative projects such as the Elementary Science Study in Cambridge, Massachusetts. The report from this first summer dealt with such matters as objectives in science teaching, the learning ability of children, and the need for an experimental approach in the schools.[2]

The Committee made the decision to work at the elementary level, and by the summer of 1964 had decided to go ahead with the development and testing of science curriculum units. The reorganized Committee was composed of teams, with the school systems of Kingston, London, Toronto, and Kitchener–Waterloo each represented by a teacher, and the universities in those same cities each represented by a scientist—chemist, physicist, or biologist. Other skilled teachers from both elementary and secondary levels in Hamilton and Toronto were active in the work that went on. Four units—'Measurement,' 'Matter,' 'Microscopy,' and 'Comparing Animals'—were developed during the summer of 1964 as the teams worked with volunteer children from the junior level in a Toronto school.

The development work continued over the next few years as the Science Committee moved under the aegis of the Ontario Institute for Studies in Education (when OCI became part of OISE). Douglas Roberts of the Department of Curriculum at OISE described the state of the project in the first issue of *Orbit* in October 1969;[3] continued development from this point eventually produced fourteen science units, some translated into French.

The OCI/OISE units (which later became known as the OTF units) were separate blocks of instruction, varying from a few weeks to several weeks, based upon a mix of concepts (e.g., the various matter and energy units), innovative ways of working (the 'Comparing Animals' unit), and an introduction to an instrument (the 'Microscopy' unit). Along with each of these went materials such as balances, microscopes, weights, and many other specialized items. Some were supplied from commercial sources, while others were manufactured under the direction of Paul Sheehan, a member of the Committee.

The Science Committee had no formal objectives, but set out to explore the suggestions and conclusions reached in *Design for Learning* and its own previous report. There was a strong need to bring science content up to date; hence the collaboration of scientists and other subject specialists with teachers in the development groups. There was an equally strong feeling that, if at all possible, materials should be placed in the hands of children and procedures worked out that would assist teachers in developing an active mode of inquiry in the classroom. There was also a suspicion—and *Design for Learning* had pointed this way—that we were not sufficiently challenging the abilities of children in the elementary school.

Other Development Groups

Other development efforts, larger in scale, were under way in Great Britain and the United States. By the mid 1960s the Nuffield Foundation of Great Britain had heavily funded a number of curriculum projects including one in Junior Science. At the same time in the United States there developed several elementary science programs supported by the National Science Foundation, notably the Elementary Science Study (ESS), the Science Curriculum Improvement Study (SCIS), and the program developed by the American Association for the Advancement of Science.

The Ontario Science Committee developed close connections with both the Elementary Science Study and the Nuffield Junior Science group. ESS invited the participation of interested Canadian scientists, with the result that Fred Gornall and Cliff Anastasiou, from the University of British Columbia, and the author, from the University of Western Ontario, all worked for varying periods at the Education Development Center in Newton, Massachusetts, the home of ESS, as biology consultants. The Nuffield Junior Science Study invited Paul Park, another member of the Science Committee, to spend a year in active work with the British group. In addition to members of the Committee working with such groups, Ontario, particularly in London, became a trial center for some of the ESS units, and Ron Wastnedge, the leader of the Nuffield Junior Science Study, became an active contributor to the development of the Nuffield approach in this province.

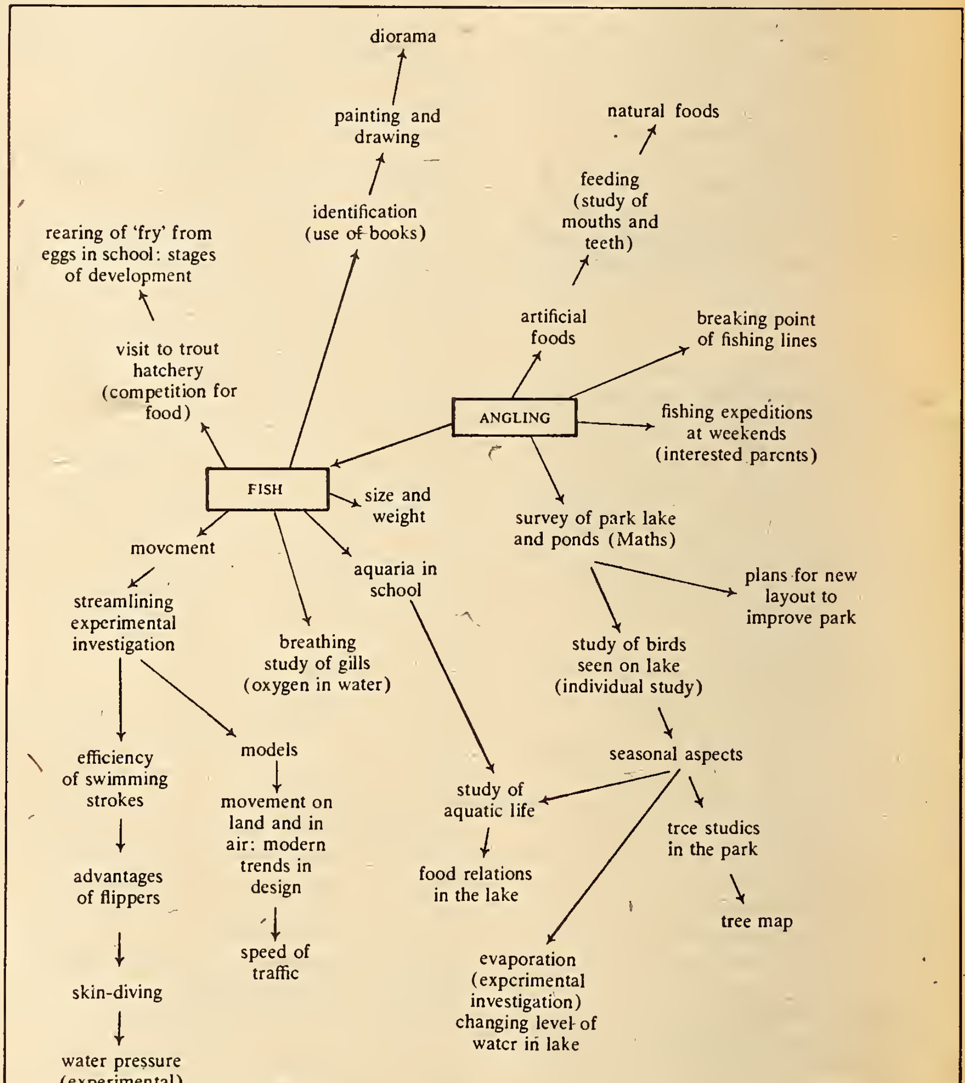
The Elementary Science Study eventually produced between fifty and sixty separate units, with such varied names as *Light and Shadows, The Musical Instrument Recipe Book, Mystery Powders, Microgardening,* and *Kitchen Physics.*[4] These had a highly problem-oriented approach in which children were led into a deeper understanding of scientific concepts or specific phenomena. Many of the units were supported by kits of materials.

The Science Curriculum Improvement Study and the AAAS program, on the other hand, became integrated year-long programs, again backed up heavily with kits of materials. They were, however, based on quite different rationales. The SCIS program had both a physics and a biology side to it, and within each of these a conceptual hierarchy organized across the six years.[5] Concepts such as organisms, populations, ecosystems, energy, and relativity were studied at the child's level.

The AAAS Program, which came to be called *Science—A Process Approach,*[6] was not organized around concepts, phenomena, or problems (like the OTF and ESS units), nor around major conceptual structures (like the SCIS program), but instead was based upon behaviors commonly used in science. These were described as observing, measuring, using space–time relationships, predicting, inferring, formulating hypotheses, interpreting data, controlling variables, and experimenting.

The Nuffield Junior Science had quite a different structure.[7] Here the teacher usually began with a phenomenon or a problem directly out of the children's environment—sometimes a technological phenomenon, frequently a natural one found in the outdoors—and from this through a discussion and subsequent questioning discovered points of interest and problems that the children might like to follow up. The result was usually set out by the teacher in a flow diagram that allowed for an overview of all the activities and could be amended as the children pursued their problems. *(See chart below)*

In its purest form this method led to individual children or pairs or larger groups taking on particular questions in which they had become interested and, with the teacher's encouragement, posing problems to themselves, devising methods of tackling these, and trying to find solutions. They usually were encouraged to illustrate what they had done either in symbols or graphs and drawings. During the development stages of the project, materials such as magnets, lenses, and animal cages were supplied to the classroom teachers by the developers. But eventually it was felt that teachers and children would be able to


diorama
painting and drawing
natural foods
identification (use of books)
feeding (study of mouths and teeth)
rearing of 'fry' from eggs in school: stages of development
artificial foods
breaking point of fishing lines
visit to trout hatchery (competition for food)
ANGLING
fishing expeditions at weekends (interested parents)
FISH
size and weight
survey of park lake and ponds (Maths)
movement
aquaria in school
plans for new layout to improve park
streamlining experimental investigation
breathing study of gills (oxygen in water)
study of birds seen on lake (individual study)
seasonal aspects
efficiency of swimming strokes
models
study of aquatic life
movement on land and in air: modern trends in design
tree studies in the park
advantages of flippers
food relations in the lake
tree map
speed of traffic
skin-diving
evaporation (experimental investigation) changing level of water in lake
water pressure (experimental)

Angling

This flow chart is included to illustrate how a program was based on an interest shown by a group of children.

supply their own things.

The P1J1 in Ontario

While the above development was going on, the Ontario Ministry of Education was revising its science guidelines for the K–6 levels. The previous guideline, which came to be known as 'The Little Grey Book,' had been reviewed in *Design for Learning*. There it had been stated that, with respect to science, emphasis in the course of study was almost entirely on living things, with little attention to physical and chemical phenomena in the environment; many of the activities listed had little or no value scientifically; and a much greater effort should be made to emphasize the treatment of central principles rather than isolated phenomena.

In 1967 was published the new guideline known as 'Curriculum P1J1, Interim Revision Science.' It was a genuine attempt to move in the direction of a more child-centered curriculum, with children carrying on active inquiry in their classrooms. For the first two grades the suggested activities were largely exploratory, using many indoor and outdoor things in the first grade, and having a seasonal approach (much like 'The Little Grey Book') in the second grade. Much was left to the teacher, who was encouraged to bring children into contact with materials, stimulate questions, and encourage them to talk about and record their experiences.

For the third to the sixth grades a unit organization was suggested. In each year a number of topics were listed as possible starting points for the teacher. The topics were a mixture, some emphasizing the study of concepts such as weight, matter, and variation; others dealing with instruments such as the microscope and the balance; and still others with phenomena such as the moon and the burning of a candle. Again in these grades there was considerable emphasis on leaving the working out of topic ideas and the obtaining of materials to the teacher. The teacher, however, was provided with a considerable reference list that included units and programs from the various main curriculum development projects noted above.

What Happened in Ontario: The OTF Workshops

All of the above, then, is background to the subsequent discussion of what happened in Ontario. From the beginning, the OISE–OTF science units got off to a strong start, largely due to the tremendous efforts of two people. From the beginning of the Science Committee, one of its members was Paul Sheehan, a teacher of physics at St. Michael's College School in Toronto. He was in charge of constructing, supplying, and continually revising many of the bits and pieces used in the units. His ingenuity and inventive skill, coupled with his energy as he scoured supply houses for the most suitable materials, provided the essential equipment backup the program needed. He carried on this work first with the Industrial Arts Department of his school, and later transferred much of it to a scientific supply firm while he continued to develop particular items.

Don Cooper from Kingston was the workshop leader, a role that came into being because the Committee decided after its development phase that it would take an active part in disseminating the units. Actually it was pressed to do so because in the late 1960s more and more school boards in the province were making inquiries about the program and asking for participation. Summer workshops evolved, then winter workshops, usually four days to a week in length. From the program started by Don evolved a newsletter, which in February 1968 reported that in the previous few months workshops had been conducted in eleven centers in all parts of Ontario. At that time some 30000 elementary school children in 172 centers from Kenora to Kingston were working with some or all of the OISE–OTF materials. It was estimated that in 1969 about 9000 students who had experienced the materials in the elementary school would be entering the secondary school.

All of which brought a need for a greater basis of support. This was supplied by the Ontario Teachers' Federation, which took over the sponsorship of the development and workshop program and contributed generously to it each year to the point of funding an office as well as the traveling workshop program. The Federation also took over the publication and distribution of the unit booklets as the number of these continued to expand. By 1973 refresher workshops were being held for teachers who had been to earlier sessions; also, beginning in this year, fifteen workshops took place attended by 234 elementary principals, who came to learn about the use of the units in their schools.

In the meantime the units of the Elementary Science Study were beginning to appear more and more in school systems, for again the unit format (as with the OTF program) probably fitted more easily into science programs in which teachers were moving from textbook-based curricula into experimenting with new ideas and attempting to handle quite different materials. As noted above too, the P1J1 had encouraged the use of a unit format.

The Early School Environment Study

Another major development occurred in Ontario in 1970 when Paul Park of Althouse College of Education, University of Western Ontario, received a substantial grant from the Ford Foundation to explore whether the methods of the Nuffield Junior Science experiment could be transferred to North American school systems. Using trial schools in three different boards in southwestern Ontario, the project spent three years in seeing whether the approach was viable in schools, what it needed in support from principals and other teachers, and how the attitudes required for the very open-ended teaching it demanded could be transferred to teachers.

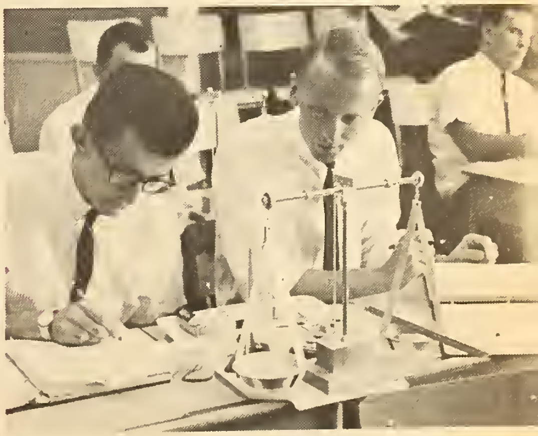
Much time was spent in giving workshops to teachers, where they were encouraged to take small problems from the environment: sometimes these were of a very immediate nature (such as why do some nylons run more than others—setting up an experiment to find out); sometimes they had to do with a social issue (such as what kind of society lived in this neighborhood 100 years ago—using data possibly from the local cemetery). Materials were not developed for teachers or classrooms; on the contrary teachers and children were encouraged to examine the materials around themselves and work at problems coming out of these.

The ideas of Park spread far and wide, beyond the bounds of the province, for workshops were given in various parts of Canada and the United States. Films and other audiovisual aids were made to illustrate the way in which the program could be used.

So by the early 1970s in Ontario three new sources of elementary science materials and approaches were available and were being tried out by teachers: the OTF science units, the ESS materials, and the method of the Early School Environment Study. The SCIS and AAAS programs were not yet receiving much attention.

Building Science Curricula

As new units became available more workshops were held, particularly within school boards themselves. But it soon became evident that schools and school systems wanted more than isolated units and were eager to attempt the building of integrated curricula. The units and particularly the equipment supplied for the OTF units had gone largely into the upper levels of the elementary school, especially grades 7 and 8, where there were frequently science rooms in the schools and teachers who had a particular interest in the subject. Where the schools were on rotary, it meant



Teachers are introduced to OCI materials at a 1965 science workshop.

that equipment could be kept in one room and the junior and intermediate classes could use it there. Where it had to be moved about, the Science Committee had devised a traveling cart on which the equipment could stand and be rolled from one room to another.

Teachers who were knowledgeable about the new science ideas and materials, from experience in the workshops and with the units in their schools, were used as resource people in their own workshops. Consequently such teachers began to become more and more interested and involved in curriculum-building.

The OTF Science Committee had been asked if its intention was to develop a curriculum by building sufficient units that could be used in an integrated and sequential fashion across several of the grades. The Committee had never intended to do this. It had, as Douglas Roberts pointed out in his 1969 *Orbit* article, originally adopted a 'stimulants and samples approach,' taking its mandate to be an experimental one to see if children could actively use a new mode in science learning in the classroom. It developed no more than about fourteen units, some of these related to safety and the use of objectives. However, the fifty or more ESS units were now becoming more available so that it was possible for school systems to draw upon a larger battery of material resources for building their own curriculum.

But the problem still remained how to organize the various physics and biology ideas into a coherent whole and match these to children's interests and stage of development. Scientific concepts have, in the minds of scientists, been organized into beautifully complex and integrated hierarchies; but when these are taught at lower levels, the interconnections between them become lost and the world can appear to be a miscellaneous collection of different and unconnected concepts and phenomena—magnets, trees, energy, reproduction, electricity, and so on. Paul Brandwein tackled the problem by suggesting that one could put together science ideas or concepts into a conceptual scheme, a kind of society of ideas.[8] In his writing he suggested six of these as ideas basic to an elementary science curriculum. Not only were they ways of organizing the many ideas of the physical and biological world, but they were also starting points from which one could think about the world. These six he noted were:

1. Under ordinary conditions, matter can be changed but not annihilated or created.
2. Under ordinary conditions, energy can be changed or exchanged, but not annihilated.
3. There is an interchange of materials and energy between living things and their environment.
4. The organism is a product of its heredity and environment.
5. The universe and its component bodies are constantly changing.
6. Living things have changed over the years.

Brandwein talked about his conceptual scheme at meetings of science teachers in Ontario and published a science program based upon these basic ideas.

The list of conceptual schemes he suggested stimulated more than one school system in Ontario to use it as an organizing device for gathering together the different scientific concepts and building a curriculum for at least the first six years. One can find, for example, in some of the larger boards a scope and sequence chart in which the conceptual schemes are listed as energy, matter, interrelationships, heredity and environment, change in living things, and change in nonliving things. These are the six organizing streams that flow through all of at least the first six years of the elementary school. In each year activities are carried out that illustrate some aspect of each conceptual scheme. Frequently OTF and ESS units are used where appropriate in the program.

However, building a science curriculum on the basis of conceptual schemes was a rare approach in Ontario. More commonly boards made available a collection of the units, wrote a number of units of their own, and through consultation and workshops assisted teachers in trying these out with children. At the same time the OTF workshop under Don Cooper became more varied, including not only the OTF units but ESS materials as well as units developed with the Milk Foundation of Ontario, and the Early School Environment Study approach. From this has grown in some school systems a simpler type of curriculum organization in which there are core units in each of three areas, called physical, life, and earth science. The schools are asked to teach the core units during the year—perhaps a minimum of three—but then have the option of selecting others from any of the three areas.

Problems along the Way: In the Classroom

Throughout the whole of science development in the 1960s there was a major problem that I believe was seriously underestimated at the elementary level by most of the developers. That was the difficulty of transferring the science content knowledge, as well as the enthusiasm for the particular programs or approaches, to the teachers. Those who were part of the original developments grew with the ideas and methods and came to have considerable knowledge and enthusiasm for the new approach in the classroom. However, those who did not have the opportunity to go through the development stages but had to in a sense start cold with the units, even after the workshops, had more difficulty. In introducing open-ended problems to children, and in allowing them to pursue investigation with materials in their own hands, all kinds of questions come up, for many of which the teacher is unprepared. How many times can one say 'I don't know' and remain credible to oneself let alone to the pupils? This problem was particularly acute in the Nuffield Junior Science Study and its translation in Ontario as the Early School Environment Study, for here there was a much greater individualization of problems; they would rise from a common phenomenon but usually branch out into lines of inquiry according to students' interests and teachers' suggestions.

The teaching of new ideas and the handling of new materials was done best, I think, where the teacher was able to work within a fairly structured sequence. The Science Committee in Ontario never went as far as suggesting lesson plans, but it did suggest sequences by which the ideas of the units could be worked out, and these apparently were fairly easily translatable into day-by-day operations. One of the most effective large innovative teaching programs in my own experience was not in science but in social studies, in *Man: A Course of Study* by Jerome Bruner and his colleagues. In this year-long program teachers are asked to look at man, animals, and social studies phenomena in a quite different way with a good deal of discussion and inquiry. The program has been laid out in lesson plans, and the experience of transferring new ideas and teaching styles in this way has been highly satisfactory, according to the teachers.

The distribution, handling, and storage of materials in classrooms posed problems that teachers tackled in different ways but that at times became overwhelming. When thirty children, even working in pairs, all have pots of water and powder and eyedroppers and other containers, one has to have high organizational abilities, nerves of steel, and a good relationship with the principal in order to have a good day. Again, things can be much better organized and controlled in the rooms set aside for science. It is in the multipurpose rooms of the lower grades where children do all their learning that the greatest difficulties arise. The ESS, SCIS, and AAAS programs put their materials into well-organized kits, usually made up of cardboard boxes, partitions, and trays, but even these require care. They also require replenishment, for a number of bits and pieces are used up in the science lessons. In the more open-ended model of the Nuffield Junior Science, classrooms tend to become filled with heterogeneous collections of materials. Boxes, drawers, and shelves are needed as never before.

Rising costs provided another detriment to the spread of teaching with materials. In the OTF program Paul Sheehan strove to keep down costs to the point of inventing a hardy classroom balance from simple parts that included a knitting needle and a razor blade. Small plastic microscopes usable by small children were commercially developed for classrooms, able to take rough handling and still have good optics. But through the early 1970s costs have doubled and tripled to the point where it has now become much more difficult for a classroom to become equipped with full sets of materials.

Changes in School Systems

While school systems were beginning to build curricula from new experimental science units, other movements were at work in Ontario that had a profound effect upon this process. In 1969 there took place a large-scale reorganization of the provincial school systems whereby some 1700 local school boards were consolidated into about 150 city and county boards. This meant that teachers from the science workshops who had found themselves under one supervisor for science now found themselves under another. Curriculum-building slowed as the new county units underwent the settling-down process following reorganization.

A second factor that had a major effect upon the dissemination of the science units through the workshop movement was the rapid expansion of the school system. The Science Committee had originally insisted that teachers could be trained in the workshops only if the boards agreed to purchase the equipment necessary to go along with the units; conversely the Committee did not sell equipment to boards unless there were teachers who had had the workshop training. The Committee was told that this was a good idea, for it ensured that knowledgeable teachers would be using the equipment. However, as the number of schools grew, the mobility of teachers was such that teachers and materials became disconnected rather rapidly. At one point in some of the larger Toronto systems the average length of stay of a teacher in an elementary school was less than two years. The teachers tended to move, but the materials tended to stay behind, with the result that principals found themselves with materials and units on hand and teachers who knew little about them. Whenever schools wanted to have teachers come to workshops so as to learn to use equipment they already possessed, this service was made available, but there was no doubt that more and more equipment was sitting unused in the schools.

Educational Trends

Still other 'movements' or shifts in school curricular thinking have impinged upon science development. There was a healthy questioning of what it was the inquiry and discovery approaches were actually trying to do. What objectives did they have? A desire for the use of behavioral objectives grew in a number of school systems and reached the point where some attention was given to it in the OTF science units. Among the developed programs the AAAS program paid most attention to the matter of trying to show more accurately, by defining objectives operationally, what it was children were learning. However, there were strong and different feelings in school systems about the use of behavioral objectives. The odd school system attempted to use them in the most detailed form, requiring teachers in a sense to be accountable for many small teaching acts, while others felt that an attempt to do this trivialized the whole learning operation.

A different role for the science teacher – guide rather than instructor.

Another impact on science curriculum development has been the growing emphasis on environmental studies. Through the 1970s man has become much more aware of the interplay between human society and the physical and natural environment, and this awareness has become increasingly reflected in the guidelines of the Ministry of Education such as the intermediate guidelines 'Science,' 'Environmental Science,' and 'Man and the Earth,' which influence the upper elementary years, and the new P1J1, *The Formative Years,* which sets out aims and objectives for the primary and junior years. In the latter the traditional subject areas of science and geography are linked together in an attempt to have children begin to understand the relationships and interactions between their physical, biological, and social environments. So strong has this emphasis on environmental studies become, including the development of the large outdoor resource centers in a number of school systems, that I occasionally feel that a great environmental wave has swept science out of the schools.

But the issue is not a simple one, and in the long run I expect nothing but a positive effect upon science teaching. Environmental studies bring a relevance into science that is frequently absent. They also bring children closely in touch with their out-of-school environment and provide greater continuity between in-school and out-of-school issues. But on the other hand they are complex; one often starts with phenomena that require a good deal of previous science knowledge (as with pollution, for example). Also they have led to a blurring of lines between fields such as science and geography, lines that are still useful in terms of organizing knowledge. The emphasis upon environmental studies has had the result that this year five major school scientific and environmental societies in Ontario have combined to put on a single fall conference, the 'Man–Environment Impact Conference.'

Still another impact on science teaching is coming from the increasing knowledge we have about how children (and adults) think. From the work of Floyd Robinson and colleagues, for example, I think it is evident that the skills we have frequently emphasized as belonging to science, such as classifying, inferring, making hypotheses, and predicting, are in reality commonly used across a number of fields as soon as we begin to introduce problems.[9] There are particular emphases in science, such as the handling and controlling of variables, that are perhaps more easily done in solving physics and biology problems, but on the whole the mental activities we associate with the scientific method are not restricted in the schools to physical and biological science.

And from the work of Piaget and the developmental psychologists we are gradually coming to be able to make a more knowledgeable match between the developing abilities of children and the environment with which we surround them in schools. The Science Curriculum Improvement Study has a series of films called *Classification, Conservation,* and *Formal Thought,* which I have found useful in looking at some of the difficulties children have in comprehending science concepts when they are at certain stages of mental development.

What Have We Learned?

First of all I believe we learned that it was possible to take some of the suggestions of *Design for Learning* and the OCI Science Committee and do something about them. Classroom units were developed with children that give attention to principles rather than isolated phenomena, and they deal with the physical as well as with the biological world—two strong points that were made with respect to updating science teaching in the schools. Second, it has been possible to give children firsthand experience with science materials in the lower grades, and place these activities in an instructional setting that allows the teacher not only to introduce important principles but to maintain a degree of open-ended inquiry in the classroom at the same time. And third, by trying out the ideas and the materials with children at different age levels, it has been possible to make a better match between children's abilities and what they are asked to learn.

Although the Committee set out with the original intention of seeing only whether it was possible to meet the above objectives in classrooms, the result of its work (and that of the science development movement of the 1960s) was to produce a number of alternatives in the way of science units and programs, other than the traditional textbook series, and to make them available to the schools and school systems as resources in building their own curricula.

However, the Committee decided to go a step further, beyond the demonstration of what was possible to the dissemination of units across the province with the help of the Ontario Teachers' Federation. Productive though this turned out to be with respect to the demonstration of such alternatives provincewide, it led to problems associated with curriculum development and implementation that are still with us.

For example, we know now that to expect teachers of science to gain new knowledge as well as change a teaching style we should go slowly and offer maximum support. The notion that most teachers can do it on their own is dead wrong. A few can, but most cannot be handed a guideline and asked to teach their classes from it. We should offer not only support in time and materials, but particularly organizational support from colleagues, principals, superintendents, and often the society around. Furthermore, the support should be in the form of long-term development rather than short-term workshops. The use of professional development days for short-term support has frequently led to frustration rather than development.

We know that the amount of support varies with the degree of change we are asking teachers to undergo. Mastering new ideas and materials and linking these with children is more easily done in a structured setting, even to the point of lesson plans, than in a very unstructured setting where the teacher does not know what is coming next. The Nuffield Junior Science Study and (its Ontario counterpart) the Early School Environment Study probably require the maximum of support for most teachers. Consequently, although I feel this approach is ideal in letting children tackle problems and find solutions, it has not been easy for teachers to work in this way in Ontario classrooms.

A second major learning for the science developers has had to do with the problems associated with the attempt to give children firsthand experience in classrooms through the use of materials. Obtaining things cheaply and storing, maintaining, and replacing take time and resources. Again the teacher cannot do it well alone, and where left to do it alone the experience for children has been a hit-and-miss affair. Bringing children and materials together is being done most consistently in boards where there is some systematic handling of the materials. Either classrooms are supplied with kits that are stored and maintained in a school resource center, with perhaps an annual check-up by the system itself, or there is a central agency that delivers materials to the schools for the teaching period and then returns them to a central depot for checking and replacement. The latter method increases costs in terms of warehouse and central personnel, but it does seem to put things into children's hands. One saves on costs, of course, by being able to share non-expendable materials among schools. But bringing each individual child into firsthand contact with phenomena in a classroom is still a big problem, and in small boards with fewer resources it is natural to fall back on the textbook and a demonstration. It is true that the outdoor education centers also bring children into firsthand contact, but at most these are visited by each child only a few times in the course of a year.

Although the Science Committee did not set out to change the curriculum of the elementary schools, it naturally hoped that its findings and developments, and those of the science curriculum development movement in general, would find their way into use. And this happened. But the Committee had no idea of the complexity of both building and implementing the curriculum—building in the sense of choosing and integrating units into a coherent plan with some attention to objectives and to evaluation, and implementing in the sense of having a curriculum adopted and working in the schools of a jurisdiction. Looking back over the last fifteen years I believe that where this has been accomplished it has been due to the presence of a science resource staff: an administrator, coordinator, consultant, or special resource teacher who had the planning ability and the time and energy to devote to the necessary organizing. Some school systems had a philosophy of centralized curriculum development, where programs were developed by resource staff and writing teams and given to schools to adopt. In other systems curriculum development was school-based, with a principal and staff planning together or teachers planning individually, without help from science resource staff in professional development and material supply. In either situation, however, it has been difficult both to build and to implement curriculum. The science program consultants of the Ministry of Education played a vital role in a number of school systems, but like many in consultant positions they found it difficult to spread themselves effectively over a number of separate organizational units, whether schools or school systems.

And a final learning coming out of the fifteen-year period, upon which the Science Committee would likely reflect if it came back into being, is that the priorities of society and its schools shift under one's feet. For example, it is difficult to know just where elementary science stands now in priority with the heavy demand for return to basic skills in English and mathematics. However, if it is still an important subject for the elementary years, the OCI Science Committee would still stand by the central idea in its work—the linking of individual children with firsthand experience of the physical and biological world. The concluding statements of the 1964 report of the Committee would still hold: 'Inquiry, however, is an individual affair and if a child is going to practice it in science, pencil, paper and crayons are not enough. The learner must have material to see and feel and measure, and simple equipment necessary to carry this out. There is no other way to do it!'

Notes:

1. *Design for Learning,* ed. by Northrop Frye (Toronto: University of Toronto Press, 1962).
2. *Science,* an interim report of the Science Committee, Ontario Curriculum Institute, December 1963.
3. Douglas Roberts, 'Samples—Total Packages—and Teacher Education.' *Orbit,* preliminary issue no. 1 (October 1969).
4. The ESS units are available from McGraw-Hill Ryerson, 330 Progress Avenue, Scarborough, Ontario M1P 2Z5.
5. The SCIS program is available from Gage Publishing, 164 Commander Blvd., Agincourt, Ontario M1S 3C7.
6. Inquiries about *Science—A Process Approach* should be directed to Ginn and Co., 3771 Victoria Park Avenue, Scarborough, Ontario M1W 2P9.
7. The *Nuffield Junior Science* books are available from Wm. Collins Sons & Co. Canada Ltd., 100 Lesmill Road, Don Mills, Ontario M3B 2T5.
8. Paul F. Brandwein, 'Elements in a Strategy for Teaching Science in the Elementary School,' in *The Teaching of Science* (Cambridge, Mass.: Harvard University Press, 1962).
9. Floyd G. Robinson, John Tickle, and David W. Brison, *Inquiry Training: Fusing Theory and Practice* (Profiles in Practical Education no. 4. Toronto: OISE, 1972).

Reading Help for New Canadians

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The program described here is for non-English-speaking New Canadian children learning to read in English. The program is based on the premise that a reader's ability to understand a text is based on his capacity to organize written material into linguistically meaningful units (e.g., The girl sat/on a chair). Evidence indicates that the number of words that the eye is ahead of the voice when reading aloud extends, for the good reader, to the end of a linguistically meaningful boundary.

The reader unfamiliar with the language confronts vocabulary difficulties that slow the reading rate considerably and hamper development of the organizational strategies characteristic of the fluent reader. Furthermore, he is unacquainted with the rhythm and stress patterns of the new language (e.g., the *biggest/* of the *boys*) and therefore fails to perceive linguistic clues. In this study, short rhyming verse was employed initially as a means of introducing organizational principles. Gradually more complex and melodic words and sentences were introduced on the premise that a reader comes to recognize words by grasping structured units and not by memorizing words in isolation.

Method

The method involves three phases.

Phase 1

The child is presented with a written version of the poem parsed into linguistic units. For example:

/ Is / the moon /
/ that shines / on animals /
/ and / trees / the same /
/ bright moon / that my /
/ pussycat sees? /

After familiarization with the new vocabulary, the child is instructed to read the parsed version in time with a taped master card of the instructor's voice. Each card contains a single line of the poem.

Also recorded on the master cards are taps, which correspond to the strokes in the written version. These taps provide auditory cues in addition to the visual cues. The tap at the beginning of each unit serves as a 'ready signal,' prompting the child to begin in time with the instructor's voice.

The reader's goal is to arrive at each stroke just as the tap is heard. The reader is instructed to pause briefly at each stroke in order to listen to the tap. In this way, reading rate is accelerated.

The method thus provides a specific subgoal — i.e., reading quickly enough to complete a linguistic unit in time for the auditory cue. This auditory cue has the advantage of providing immediate feedback that allows the reader to modify reading rate and style.

Phase 2

As the reader gains proficiency, the length of the units to be read is increased. Consequently reading rate must also be accelerated in order to correspond to the auditory cues. Example:

/ Is / the moon that shines /
/ On animals and trees /
/ The same bright moon /
/ That my / pussycat sees? /

The speed at which units are lengthened is varied according to the individual needs of the child and the rate at which he is progressing. In another exercise, which serves to reduce reliance upon the external support of the instructor's voice, the reader is instructed to read *without* the master and to pause in the appropriate locations. He then listens to each line of the poem and attempts to discover at which points he has failed to pause.

Phase 3

In this phase the child reads each line of the poem onto a blank master card. The goal is to read each line quickly enough to fit it onto the card, while still pausing at the linguistic boundaries marked by the strokes. After taping a version of each line, the reader replays the card, silently reading the written version while listening to his own voice and noting errors. When the reader has identified these errors, the card is wiped clean and another attempt is made. Alternatively, a teacher can keep several of these cards, allowing the child to replay earlier versions to note his own progress. As the child gains proficiency with the particular poem, the length of the line to be fitted onto the master card is gradually increased.

The three phases of the program are interchanged as the instructor deems appropriate for the individual reader.

In order to maintain interest and create a relaxed learning atmosphere, it is useful to mix longer and shorter poems, returning to earlier poems with which the child is familiar in order to restore confidence before attempting a new poem.

Results

Training was carried out with four Portuguese 9-year-olds — all below grade level in reading performance. These children had been in Canada for an average of two years.

Reading aloud was analyzed in terms of (a) rate (words per second), from which an estimate of words per minute was made, and (b) phrasing within five-second time blocks. The data indicate that all four children achieved a reading rate quite adequate for their age (a rate of 180 words per minute). When they were tested with new poems, even in the absence of auditory feedback, improvement in reading rate and expression was striking.

Further, the number of words read within the five-second time blocks varied from two or three to as many as six words, depending on the number of words within the unit being read. Indirectly, the finding also reveals a tendency to read ahead, for only by reading ahead silently could the reader have determined at which point the unit ended, and so alter his reading rate to complete each unit within the unconsciously alotted time.

Why don't they learn to write?

Priscilla Galloway, OISE

In the year since I first wrote on this topic, the cries of 'Back to the basics!' have grown louder. Ontario's Ministry of Education has commissioned a half-million-dollar inquiry into the state of literacy of students at the end of their high school and beginning of their university education. The focus of attention is on writing. While we wait for this study, however, a number of points need to be made, not all of which will necessarily be documented or even considered later.

Both parents and business people, while they talk about 'basics' in terms of the old three Rs, are really most concerned about writing; and when they get up on their hobbyhorse, they're off at a gallop on grammar and spelling. Why don't kids today learn grammar the way we did? Why can't they spell?

Teachers worry about it too, and often in the same way as others in the community. English teachers likely worry most of all. It's hard to get much job satisfaction when you feel you're being blamed all the time, especially if you really put your heart and soul into it and can't yourself see the results you'd like.

We all fall into the emotional trap, useless though it is, of trying to pass on the blame.

Parents, and many teachers, make the mistake of equating lessons in formal grammar with improvement in written English. In fact, research has shown there is no direct relationship, at least where it's the old-style grammar that's in question. In other words, knowing the five uses of the nominative case, or the eight uses of the objective, won't in the least bit help you to write a cogent paragraph. Knowing how to take a sentence apart by parsing or by analyzing won't give you what you need to put sentences together.

But in any case, this concern with formal, old-style grammar really misses the point. What we're all worried about, parents, business people, and teachers alike, is surely the ability of young people to express themselves in writing. We'd like to see them able to do it powerfully, incisively, fluently, with ease and grace. But we'd all settle quite happily, I suspect, for general ability to write plain, straightforward English prose.

Few things are more difficult to do well. Few things are more difficult to teach.

Incidentally, it continually strikes me as curious and fascinating that we are so much concerned with deficiencies in writing and so little concerned with deficiencies in reading. We do, after all, set out to help our high school students develop some competence in writing, to improve the skills they have already acquired when they start their high school careers. At least we accept that task as part of our responsibility, even if we teachers have great difficulties in carrying it out.

Most high schools, most high school teachers, do not accept responsibility for the task of helping students improve their skills in reading. We do not tend to think of reading as something that can continue to be improved indefinitely, just as much as writing. We think that students should have learned to read long before they get to high school.

But that's a big topic, properly the subject of another article. At the moment, we're concerned with writing.

Many teachers in high school, community college, and university and many members of the community believe that standards have declined, particularly since the abolition of grade 13 exams. There may be some truth to this belief, though it would be difficult to prove when our student population is so much more inclusive today.

One of my colleagues has suggested that if universities really wanted to return to the standards of, say, the 1930s, the solution is perfectly simple. Shut down half the present university student spaces. Admit only half as many freshmen in 1976 as were admitted in 1975. The proportion of students entering would be about the same as it was forty years ago, and if the better students were the ones selected, the universities would find no difficulty in maintaining those earlier standards.

He can safely make the suggestion knowing that no one is going to take it seriously. It's a different world we live in today; even if we could, we don't really want to turn back the clock. We expect to live more comfortably, more luxuriously, than our parents did. We believe that education contributes to this lifestyle. We see formal education not as a thing that gets finished but as a thing that continues at various times in our lives; and we expect more education for our youngsters than we had the chance to get ourselves.

But, proof or not, many, many experienced teachers have a gut feeling that there is a decline in the quality of written work, and I have developed, through long experience, a thoroughgoing respect for teachers' gut feelings.

What might be causing such a decline?

There has been one major change in English classes in about the same period since the abolition of provincewide exams. It has forced many changes in the organization and structuring of English courses and methods of teaching. It might have a good deal to do with student writing!

This is the introduction of individual computerized timetabling, with its almost invariable accompaniment of equal time for each different subject, usually one period each day. That way English has five periods a week—the same, say, as geography.

Why not? In this age of equality, aren't all subjects equal?

They didn't use to be, of course. When you and I went to high school—unless you graduated within the last six or eight years—we had seven (sometimes eight) periods of English every week and likely three (occasionally four) periods of geography. Usually four of the English periods were literature and three were composition and grammar, usually with more composition than grammar at that.

Most English teachers are more comfortable teaching literature than composition. This is what they have been trained to do in university, and it's the way they were taught when they were in high school themselves.

So, with five periods a week instead of seven or eight, it's a great temptation to teach units of literature rather than literature and composition. Teachers say, with much truth, that if you do a lot of jumping around in those five periods, you lose the continuity of whatever you are trying to do.

Besides, there's lots of writing that can arise out of the work in literature. Questions can be answered. Book reviews can be written. Big projects such as research essays, mini-university work at the high school level, can be undertaken.

But that's only one aspect of the problem.

Suppose our English teacher, like all the other teachers in our school, is teaching about thirty-one or thirty-two periods per week. Something about this number has been fairly standard for the last fifteen years or so.

When I started teaching in Toronto over twenty years ago, I taught five classes seven periods per week, a total of thirty-five periods. Some English teachers are doing that today, though most don't have quite so heavy a timetable.

But look. Twenty years ago, thirty-five periods meant five class groups. If the average class size was thirty, this meant 150 students.

Today, thirty-five periods means seven class groups. If the average size remains the same, the teacher is now responsible for 210 students.

Now, let's consider how a person really learns to write. Remember, it's not done by lessons in verb tenses. It's not done by copying sentences out of a textbook, completing them by putting in the right word. 'She *laid* the book on the table. He *lay* down. (Lay, laid).' By the time the textbook is being used for the second or third time around, several will have made something much more interesting of that combination: anything to relieve the tedium.

I don't blame them. Is anybody passionately excited about learning some artificial rule about which of those wretched verbs is transitive and which intransitive? In the real world, that rule and others like it have to be way, way down on any reasonable person's list of priorities. And most students, I think, are reasonable people, certainly as reasonable as the rest of us.

In any event, all the copying of those sentences, all the learning of rules, won't change the way the native user of English naturally uses language. We have the sound of that in our ear, the habit of it firmly patterned in our mind. And that's where grammar really is, and if we want to study it productively, that's where we should start, with the living language, from the mouth or pen of the user. Not with some list of rules.

You learn to do something by doing it, by doing it a lot, by doing it in increasing complexity, by doing it often and regularly, by doing it under careful supervision of somebody who can show you how it should go. Learning to write isn't any different from learning to swim, as far as the basic rule goes. You learn to write by writing.

Then, if you're going to improve, you need somebody to look over your shoulder and make suggestions. Or to look at your finished work and act like a newspaper editor and put you on the rewrite desk.

Now, come back to our English teacher.

Remember, he might have 210 students. Most English teachers today have six classes — say, about 180 students. In the 1960s, teaching the same number of periods, most teachers probably had four classes (about 120 students) and some study hall or library supervision to make up the rest of the timetable.

It's quite possible to give 120 students quite a lot of practice in writing and to have a pretty good idea of where each one of them is, what the strengths and weaknesses of each one are, where each one needs help most badly. It's a pretty demanding job, but it's not impossible.

With 180 students — let alone 210 — it's impossible. No two ways about it. It can't be done.

You can give the kids a lot of writing assignments, of course. But they tend to lose interest when they know teacher isn't going to look at them, or not very often, not very carefully. Somehow, they've got the idea they're writing for the teachers, not for themselves. It's hard to change that notion, especially since so many teachers share it.

Now all we have to do is add a few of the other things our English teacher is expected to do at the same time, such as theater arts, or the study of media, or the development of new courses in Canadian literature (where he maybe hasn't even managed to read the books himself yet).

Is it any wonder that our students don't get a lot of writing assignments?

Should we really be surprised if kids today don't write as well as they did a few years back?

No, but what are we going to do? Throw out the individualized timetables? That wouldn't be popular, would it? Go back to seven periods of English and three of geography? Geography teachers, and all the other teachers who feel they finally have time to teach a really decent course, would just love that, wouldn't they!

In some schools, the unit in literature is followed by the unit in composition. This is better than nothing, but it doesn't give the regular practice that is needed, and composition gets less time than literature anyway.

Some schools, some teachers, are developing courses in writing where the student can get his five full periods a week. It's hard to do, especially when the teacher isn't used to working this way, but some people are finding it worth doing. Mind you, the kids who choose this kind of course are usually the ones who need it least, whose command of writing is already pretty good. A course in writing is hard work for the student as well as the teacher. Anyhow, the writing course is optional. Students will be encouraged and may be required to take the regular literature-oriented course first.

Of course, the school couldn't cope if all its students suddenly did choose to take courses in writing. But they won't. Hard work isn't all that popular.

Some schools, some universities even, are offering remedial programs. These are crash courses for disaster cases. They aren't designed to raise the general level of writing any more than hospitals are designed to improve the general level of health.

It's not an especially bright picture. Perhaps, instead of being upset that our children are learning so little, we should appreciate the tremendous effort that most teachers actually do make and be pleased with what improvements we do find.

Originally, when the timetabling change was made, it was expected that teachers in other subjects would quite naturally teach their students the writing skills they needed in that subject. It hasn't worked out that way. The science teacher tends to mark the notebook for neatness and completeness. He doesn't want much in the way of consecutive prose. Other teachers too feel themselves not well equipped to be teachers of writing.

I wish there were an easy solution. There isn't one, though there are some things teachers and schools can do. We might get outside markers back in the picture, for instance. We might free some teacher time specifically for tutorial help. We can get some bite-sized objectives and teach students to help each other attain them. We can encourage fluency, we can help students to get comfortable with pen in hand, by requiring at least a small amount of written work from each one every day. Nobody has to check every comma; in fact, it often makes sense not to check it at all, except to see that there has been some writing done. If the teacher has the energy, and takes the time.

There are things business people can do too. How about sponsoring a local essay competition, with different categories for entry, and as many $25, $10, and $5 prizes as you can afford? Don't get a panel of teachers to judge the entries, either. Try to include a newspaper reporter or a writer, at least one student, somebody from the Home and School, somebody from a community college or university, and perhaps one high school English teacher.

Parents can help too. The more reasons you can find for your sons or daughters to write notes or letters to you, other relatives, friends, politicians, or newspapers, the better. At least that gives you a reason, a sterling and unselfish reason, to go yourself on that trip to Florida, or Jamaica, or Hawaii next Christmas and take your spouse, but leave the kids at home, with a fire roaring in the chimney, popcorn on the hearth, and piles of paper, pens, and envelopes left handy on the table.

More seriously, you can find out what the situation is at your school, in your child's English class. Not in any fault-finding way, but in a spirit of understanding, parents can and should find out how they can help teachers and schools to help our children write.

And what's your opinion? How do you attack the teaching of writing skills? What kind of program would you like to see? We look forward to publishing your responses in forthcoming issues.

Hydroponic Gardening

Helmut Julinot
City Green Hydroponics, Mississauga

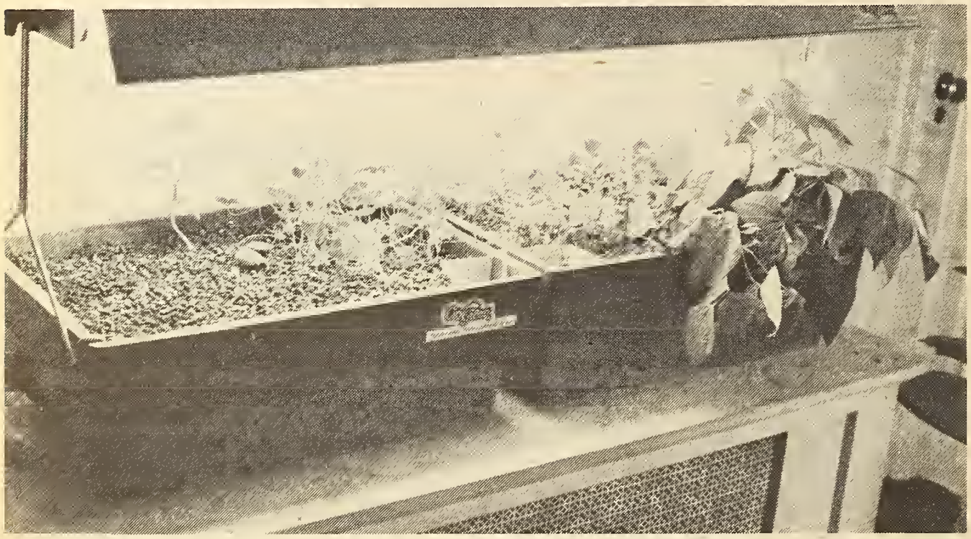
American high schools are using Canadian-made hydroponics kits as teaching aids in support of such subjects as biology, ecology, and environmental sciences. In Canada, these self-contained units are used by more than 10 000 amateur gardeners for such pleasant hobbies as growing tomatoes on the balcony, herbs in the living room, or prize-winning orchids in the basement.

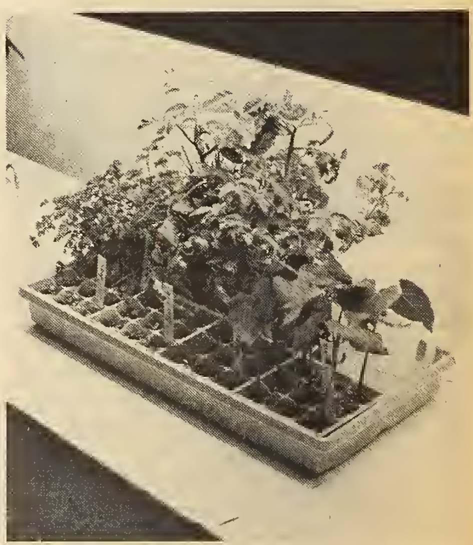
Although the growing technique of hydroponics is as old as the pyramids, its adaptation for year-round gardening in the home began only about a year ago when my firm introduced a line of self-contained 'soilless' growing kits. I had a hand in their development, and I was therefore very intrigued when more and more purchase orders arrived from American school boards. To find out what American teachers did with our growing kits, I visited several schools in the California school system.

Ed Sherman teaches biology in grades 5 to 9 in a public school in Marin County. 'Biology used to be sort of a "wallflower" subject,' he states, 'but I believe that it's become probably the most important item on the curriculum in our age. And I'll tell you why.

'As we see more and more clearly how all life on this planet is interconnected and interrelated, we realize how fragile this web of life is. Especially plant life we have taken very much for granted, yet plants are the crucial link in our food chain. You see, only plants can synthesize inorganic minerals into organic molecules on which animals and humans feed. To put it into simpler terms, only plants can eat rocks. Humans and animals can't.'

A look at the neighborhood around the school underlines his point. Lawns and gardens are a dead brown, and most cars are filthy. The ground water level in Marin County is lower than ever in recorded history, and because of the severe water shortage an ordinance has been passed making the watering of lawns and gardens and the washing of cars illegal. The point is not lost on his pupils, and the water shortage lends an air of stark reality to the environmental points Sherman makes in his classes.





(Left) *The Soilless Garden – a pump circulates the nutrient solution through the aggregate in which the plants are rooted and 'growlights' enable the plants to flourish indoors.* (Right) *The Hydroponic Plant Nursery – seedlings are planted in small trays and are fed with a nutrient solution from a gravity-operated reservoir.*

'Our soil here was never that great to begin with,' he says, 'and most of it has been killed with overapplications of chemical fertilizer. Within twenty years most agriculture here will be going to hydroponics. It will have to, to conserve water and nutrients.'

That's only one of the advantages of this amazing growing technique. Let's take a moment to look at what hydroponics is and how it is being enlisted across the world to deal with environmental problems.

Hydroponics is not a new science by any means. The earliest recorded use was in the Hanging Gardens of Babylon, one of the seven wonders of the world of antiquity. These terraced pleasure gardens were grown entirely in gravel, kept moist with fertile river water by an army of slaves under the watchful eye of Queen Semiramis. About three centuries ago, John Woodward, a Fellow of the Royal Society of England, performed experiments to determine how plants obtain their nourishment. Was it from the earth, the water, or the air? While he was thus using hydroponic (i.e., soilless) techniques in the laboratory, he was handicapped by lack of proper equipment and could make little progress. Nor could the scientists who followed in his tracks until the beginning of the 19th century. From that time on, French and German researchers conducted further trials that led to the development of laboratory-type hydroponic culture. This was universally accepted by 1920 for scientific work with plants.

About ten years later, a professor at the University of California, Dr. William Guericke, transformed laboratory-style hydroponics into a more practical form of growing food for human consumption. He set up outdoor hydroponic units that were brilliantly successful. His tomato vines reached heights of 25 feet and had to be harvested with ladders. It was he who named the technique 'hydroponics' (from the Greek — 'water-working'). With the publication of his results — including a cover story in LIFE magazine — the use of commercial hydroponics spread rapidly across the U.S.A. and Europe as commercial growers began using the newly rediscovered technique for raising vegetables and flowers on a large scale.

One famous example was the giant hydroponic garden operated by Pan American Airways on Wake Island, where their propeller-driven 'Clipper' planes on the Pacific run had to land for fuel and provisions. The advent of World War II put an even greater premium on the production of food in barren and inaccessible locations, with both the American Army and the British Royal Air Force opening hydroponic units at military bases to provide several million tons of vegetables without soil.

Today, there is no continent where hydroponic gardens and farms are not flourishing. Big commercial units in North America and Europe, as well as in Japan, turn out quantities of fresh produce all year round to feed landless city-dwellers. In the Sahara Desert and on the sandy wastes of the Arabian peninsula, oil companies maintain hydroponic installations to supply their employees with health-giving greenfood. The American Armed Forces still operate their soilless gardens in the Far East, while in India thousands of householders raise essential vegetables in simple hydroponic units on rooftops or in backyards.

Countries such as the Canary Islands balance their economies by exporting vast amounts of hydroponically produced tomatoes, cucumbers, and lettuce to industrial states such as Britain every year. From the Caribbean area, too, Puerto Rican and Mexican growers are shipping immense quantities of hydroponic fruits and vegetables to the insatiable United States and Canadian markets. In England, Germany, France, Netherlands, and Switzerland, growers increasingly prefer to employ the soilless method for commerical growing. The list of countries using hydroponics to feed their populations is endless. One-fifth of all the vegetables consumed in Moscow are grown hydroponically.

There are full-fledged hydroponic units in American atomic submarines, in Russian space stations, and on off-shore drilling rigs. Large zoos keep their animals healthy with hydroponic greenfood, and Canadian racehorses grow sleek and powerful on grass grown hydroponically year-round. There are several dozen hydroponic greenhouses in Canada, providing tasty vegetables grown without soil to Canadian gourmet shops. In the Ontario area, Bittner's Delicatessen stores carry hydroponic tomatoes, and their superior flavor is well worth the extra cost.

The advantages of hydroponics for commercial growing are many. Since there is no tilling, raking, and hoeing, it takes the backbreaking work out of gardening. There are no weeds to pull and no poisonous chemicals to spray. No moles or cutworms eat the roots, and most insects leave the clean and healthy plants alone. A further reason is the vastly increased yield: hydroponic plants outstrip and outproduce their soil-bound cousins because they don't have to push their roots through chunky soil nor fight insect pests and weeds.

With hydroponics, the yield from a given

Crop	*Soil-grown*	*Hydroponic-grown*
Tomatoes	5–10	60–300
Lettuce	4	10
Cucumbers	3	14
Peas	1	9
Beans	5	21

area is five to fifteen times greater than in conventional agriculture. Growers and scientists are reporting typical figures of yield (in tons per acre) as shown in the table. It should be kept in mind that these figures are not superscientific laboratory results, but are achieved year after year in greenhouses and open hydroponic fields.

By 1971, I had visited a number of these incredible installations myself, both in Israel and in the southern U.S.A. At that time I lived on the twenty-second floor of a downtown Toronto apartment building and I was suffering from a bad case of 'Itchy Green Thumb.' More and more I found something missing in the vegetables I bought in the supermarket — flavor. I knew that the vegetable seed strains developed for 'agribusiness' growing were chosen for fast growth and high yields, with tough skins for machine harvesting and sorting, rather than for old-fashioned flavor and fragrance. What's more, many vegetables, especially tomatoes, are harvested unripe because this way they travel better and have a longer 'shelf life' in the store.

I looked at my large balcony and decided I had a prime agricultural area — almost. I had sun, fresh air, water as close as the kitchen tap. What's more, because a balcony is well out of the range of ground frost, I'd have a significantly longer growing season than conventional gardeners. The only thing missing was soil.

I knew enough that you can't just lug buckets full of soil up to a balcony and expect to grow vegetables in it. On the ground, the soil is part of a big natural fertilizer factory. It gets fed — hopefully — with organic manure and dead plant matter. Soil organisms and bacteria go to work on these organic substances and break them down into their inorganic constituent parts so that the plants can feed on them. Contrary to what many well-meaning people believe, a plant cannot take up any organic substance, but feeds exclusively on the inorganic molecules of the mineral kingdom. That's why plants are such a vital link in our planet's food chain.

It did not require a great mind leap on my part to put two and two together by adapting the proven soilless growing technique to the crowded density of metropolitan areas. In four years of research, we cut the large commerical growing beds down to family size and replaced all the complicated equipment and plumbing with a simple air pump. To deal with Canada's painfully short growing season, we added special growlights so that home gardening can continue indoors as soon as the first frost falls.

Our 'Soilless Gardens,' 'Hydroponic Plant Nurseries,' and 'Growlights' took the fancy of Canadians ever since their introduction in the summer of 1975. I am happy to report that they have made Canada the leading country in the world in home hydroponic growing, with more than 10 000 mini-gardeners cultivating a combined area of more than 60 acres hydroponically, year-round, from the Yukon to the Maritimes. Letters and photographs from our growers testify to the pleasure of picking salad greens in the living room, or tending a productive garden when snowstorms rage outside.

I am very excited by the use of our hydroponic units in the educational field, especially in California. The advantages are many. Instead of in dirt and muck, the plants are grown in a clean bed of inert aggregate, which is kept moist with a solution of water and mineral salts. Growth is fast and reliable; on the other hand the effects of nutrient deficiencies may be produced and demonstrated conveniently and easily. An environmental chamber is not needed for plant propagation, since the curtain of moisture rising from the hydroponic aggregate serves to keep the atmosphere surrounding the plants close to the desired 50% moisture, even if the surrounding indoor air contains only 10% moisture typical for winter.

Because of the loose, porous aggregate, plants may be removed easily without damage to the roots, to observe the root development and structure; generally, it is possible to replant or transplant hydroponic plants many times without causing shock, wilting, drooping, or dropping a single bloom or fruit.

Because of the ideal growing conditions afforded by this technique, growth is some 20% faster than in soil. Since the roots don't have to compete for nutrients, plants may be spaced much closer than in conventional growing. What's more, since these hydroponic systems are automatic, the problem never arises as to who is going to water the plants during weekends or over holidays. The larger 'Soilless Garden' is operated by the 'Plant Sitter,' a small air pump that aerates and irrigates the plants' roots silently and continuously. The smaller plant-starter kit, the 'Hydroponic Plant Nursery,' looks after the seedlings in it with a gravity-operated reservoir.

We have put together two educational hydroponic kits (beginners and advanced) comprising our units, hydroponic textbooks, and other study material for classroom work. From our experience in the U.S.A., student interest and involvement is high, because few thing today bridge the gap between the generations more successfully than the common interest in growing things and in the environment. Will there be a food crisis following on the heels of the energy crisis? Have we neglected plants as our natural ecological partners? Are we running out of growing space?

In science fiction stories, every second spaceship seems to come equipped with a hydroponic unit to supply food on interstellar voyages. More important, can hydroponics help us back on Spaceship Earth? It is becoming painfully obvious that in our times, Mother Nature needs all the help she can get.

READING in the Kindergarten

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A child gets pleasure from listening to someone read and, at the same time, observes that books give answers to questions. The desire to read develops naturally and through exposure to materials of good literary quality that enrich listening and speaking vocabularies. These, in turn, develop a meaningful reading vocabulary. Experiences that enrich and broaden the scope of language are essential to the development of success in learning to read.

Children between the ages of 4 and 5 may begin to ask questions about the identity of words, letters, and numerals. Some children may inquire when they are younger, and others will show no curiosity until later. When a child asks, 'What does this say?' we can be fairly certain that he or she is making a major step in beginning reading.

Individual differences are great, and teachers are faced with the pressure of moving children along in reading sometimes more quickly than a given child's readiness for formal instruction indicates. Irreparable harm may be done if children are confronted with decoding printed words and memorizing word lists just because a certain birthday has been reached.

To many people it would seem that looking at pictures and discussing them, playing with toys, and enjoying excursions are irrelevant in terms of learning to read; but understanding and depth of meaning grow out of such activities. Written or spoken words have no meaning in themselves but can become instruments of communication. We can train a parrot to articulate, but only man can fill these sounds with meaning. The child has to learn to attach meaning to words because words are living links between the individual's inner world of ordered experience. For example, there are children who do not know what a lamb is. If a child can see one, hear it bleat, watch it move, feel its fleece, and hear someone call it a lamb, the word then takes on meaning.

Parents often ask if they should teach their children the alphabet before they start school. If children show an interest and ask questions about alphabet letters, the parent should provide answers. There is some evidence to indicate that children who recognize the alphabet letters make better progress in beginning reading than those who do not have this knowledge. However, teaching the alphabet letters to a child does not take the place of more basic readiness competencies such as a desire to learn to read and a background of experiences.

The market is presently flooded with phonics and word-analysis books geared to the young child. For most 5-year-old children, formal lessons in phonics and word analysis are premature, and can indeed impede early success in learning to read. Time would be better spent on providing creative learning experiences to develop language.

An interest in words can be encouraged through the use of experience charts to record important events in the classroom. In this way children learn that we read from left to right and that printed words and sentences convey ideas. There are countless occasions occurring daily in the classroom that the teacher can utilize for writing stories as the pupils dictate and observe the process.

— Writing accounts of group experiences, such as an excursion to the farm or a walk to the park.
— Labeling materials in the classroom (scissors, beads, etc.) as well as putting the children's names on anything that needs to be identified as theirs.
— Creating stories, poems, and songs and recording them for future use.
— Writing group letters, invitations, or greetings as the need arises.
— Recording observations made in projects such as the hatching of eggs or the sprouting of seeds.

The purpose of these activities and others conveys to the children a means of preserving the spoken word and, at the same time, communicating it to others.

When pupils observe the teacher writing what they are dictating, they may later 'read' from recall what they saw being written. Some children with good visual discrimination will recognize specific words, and likenesses and differences in others. As they say the words, they will detect sounds that are alike and different. When such discoveries are spontaneous, learning to read appears to be as natural and effortless as eating.

We all know that a hungry child will eat without being coaxed. When there is a genuine desire to learn the mysteries of printed symbols, forced feeding and the use of gimmicks will be unnecessary. Teachers need to closely observe children for this kind of hunger, as either forced feeding or a starvation diet can do irreparable damage to both present and future academic growth.

No, reading is not taught in the kindergarten, if by teaching we mean having pupils take part in word drills, memorize the letters of the alphabet, drill on letter sounds, or do routine exercises with stereotyped teaching materials and workbooks.

Yes, reading is taught, if by reading we mean
— arousing children's interest in things about them and encouraging them to ask questions and seek answers from every available source.
— reading to them and giving them opportunities to become aware of the sound and meaning of spoken language.
— using writing whenever needed so that they learn the relation of speaking to writing and of writing to reading.
— answering their questions about words and letters.

Like other aspects of learning at this stage, communication is a total experience. By encouraging the child to use language in all its diversified forms, we foster the full development of each mode of communication for his or her later use.

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'NOT ANOTHE

Len Chellew and Vern Trott

'Our meetings are a bore! We talk and talk and talk but never decide anything.'

'We meet to hear announcements. It's a waste of time. A good memo would be better.'

'Most of us don't say anything. The same three or four people decide everything.'

'We don't listen to one another. Small groups are always chatting together. We wouldn't permit this in our classes.'

'Our principal tries to make us believe we are involved in making a decision, but he has already made the decision before he comes to the meeting.'

'People are put on committees who are not interested in being on them.'

'I've been on lots of committees, but most of the time I don't know what our job is.'

We have all heard remarks like these, and many of us have made them. However, good meetings do take place, committees do provide useful reports, meetings do get called only when the circumstances are appropriate, and people do understand and accept the responsibilities that accompany their membership on a staff or committee.

Why is it that some groups are productive and enjoy high morale and others are unproductive and apathetic?

In this paper we will present some of the findings from careful studies of meetings and include models of meeting procedures that have evolved from these studies.

Leadership

The key person in a group (staff, committee, department) is the designated leader. (In using this term 'designated leader,' we are referring to the chairman, chairwoman, principal, president, coordinator, convener, or the like.) The person in this role is often in a quandary regarding the best style of leadership to use in different situations. In our society we have a tendency to say that a leader is either democratic or autocratic. We applaud the democratic and decry the autocratic.

Robert Tannenbaum and Warren Schmidt dealt with this dilemma in an article in the *Harvard Business Review* (1973, no. 3) entitled 'How to Choose a Leadership Pattern.' They stay clear of the democratic–autocratic tangle and develop the concept of appropriateness. What is the *appropriate* choice of leadership style given the circumstances the leader faces?

They analyze three sets of forces that impinge on the designated leader. The first set includes his value system, his confidence in his subordinates, his own leadership inclinations, and his feelings of security in an uncertain situation. The second set of forces affects the behavior of the group members: these are their willingness to assume responsibility, their tolerance for ambiguity, their interest in the problem, their understanding and acceptance of the goals of the organization, and their skill and experience in the problem-solving procedures. The third set of forces are those that exist in the general situation relative to the problem to be solved—the amount of time available, the nature of the problem, the decision-making traditions of the organization.

A designated leader (principal, convener) who is aware of the three sets of forces will choose the leadership style appropriate to the circumstances. In one situation he makes the decision himself and announces it; in another he makes a tentative decision but is ready to modify it after discussion with the staff, committee, etc. On another occasion, he may give the group all the freedom to help in making the decision (within possible constraints imposed by his own superior). Above all, he tells the staff or committee at the outset of the life of the group why his style of decision-making will be different in different situations. The designated leader who does not do this will create confusion, apathy, and lack of trust.

In summary, Tannenbaum and Schmidt contend that there are two implications in their thesis. The first is that the successful leader is one who is aware of those forces most relevant to his behavior at any given time. He understands himself, the individual or group he is dealing with, and the organizational and social context in which he operates. The second implication is that he is able to behave appropriately in the light of these perceptions. If direction is in order, he is able to direct; if participative freedom is called for, he is able to provide such freedom. He can be primarily characterized neither as a strong leader nor as a permissive one.

There is another model that focuses on leadership in decision-making situations and committee work—for example, when a group is preparing the background information for a report or discussing a topic for the purpose of enhancing each member's understanding. This model is called 'shared leadership' or 'functional leadership.' It presents leadership as a set of functions that must be performed if a group is going to continue to live and accomplish its task. These are divided into two categories—task functions and human relations functions. Included in the task function category are such acts as stating the problem, clarifying the problem, asking for and supplying information, offering procedural suggestions, and summarizing. Human relations functions are acts that support, encourage, harmonize, help face and resolve conflict, and absorb hostility. In the early stages in the life of a group the designated leader is responsible for supplying all functions that build and sustain the morale of the group and its members and move the group toward its goal. Group members can be encouraged over time to take over these functions. This results in a sharing of the leadership actions and a sharing of the responsibility for the morale of the group and the completion of the task.

However appealing and consistent with principles of democratic action 'leadership as a function of the group' may appear to be, its real test is in its practical value. There are, fortunately, a number of clearly demonstrable values that support the shared-leadership approach.

1. When a group turns its creative power to the problem of organizational policy-making, there is a much greater chance that a reasonably complete inventory of possible solutions will be made than if one or a few individuals undertake to do all the thinking.
2. The morale of the group is strengthened when each member feels that his ideas are sought, welcomed, and respected.
3. There is greater support for administrators in the execution of policies that are the result of cooperative deliberation rather than administrative edict. They are thought of as 'our' policies rather than 'his.' People are committed to the support of policies they have helped to formulate.
4. There is greater understanding of organization policies, and they are carried out with more sympathy and initiative, when people have shared in reaching the decisions by which they are expected to abide.
5. The individual member is strengthened in the practice as well as the theory of democracy through participation in formulating policy.
6. Since the behavior of the individual is the sum of the values that are shaped by his experiences, a person is more likely to work democratically with others when the organization as a whole is permeated with the cooperative approach to problems of common concern.

R MEETING!’

7. Public relations are strengthened significantly in organizations where the shared-leadership approach is accepted. Members generally can interpret most intelligently to outsiders those practices and conditions that they have helped to shape.

8. Shared leadership is interpreted by group members as a statement by the designated leader of his confidence in them.

We commend a study of the Tannenbaum and Schmidt article and an article by Benne and Sheats, ‘Functional Roles of Group Members’ *(Journal of Social Issues,* 1948, no. 4, pp. 41-49). Acceptance of the concepts presented in these articles will help in the development of a frame of reference about leadership. The suggestions about making meetings more productive, which follow, are grounded in the positions presented by these and other social scientists.

When Is a Meeting Necessary?

This is a question that the designated leader must consider.

Will this problem, decision, or program be communicated more effectively in a face-to-face situation rather than in writing?

Will the contributions of others help in solving the problem?

Will the problem under consideration benefit from the creative thinking of a number of people?

Will a decision require implementation by others?

Will my leadership of a meeting release the creative potential of the group?

Will the group work more effectively on the problem if one of their peers is the leader?

Are there concomitant benefits in meeting?

If the leader makes known to his group that he has considered questions such as these before he calls a meeting, the group will be more willing to attend and participate.

Some organizations meet on a regular schedule. This allows all members to plan ahead, to submit their concerns and ideas as items to be placed on the agenda. When members know ahead of time what routines are associated with drawing up the agenda and that the meetings are structured to consider their interests, they are more positively disposed. Confidence that the meeting is indeed for them also helps avoid the situation where the ‘real’ meeting takes place before or after the official one. An organization is in deep trouble when the members believe that it is not possible to say what they think in the official meeting and have to express their concerns to sympathetic listeners outside the meeting.

Large Staff Meetings

Some schools have a staff so large that the traditional concept of a staff meeting is impractical—for example, where there are 75 to 150 teachers on staff. When a staff of this size meets, the format is usually for giving information, and the direct involvement of individual members is impossible. Nevertheless, procedures can be worked out that allow the individual staff member to contribute to decision-making. Committees in particular—ad hoc and standing—provide opportunities for interested and willing staff members to influence the decisions that affect their work and lives.

One school staff (75 staff members) elects a steering committee for the year. This committee is responsible for all staff meetings. A member of the committee acts as the designated leader for each meeting. Individual staff members may place an item on the agenda by submitting a brief statement about an issue to the steering committee. At a subsequent staff meeting, this member speaks to the item and general discussion follows. The sponsor of the item is expected to accept the leadership of a committee that will report at a later staff meeting. If the report is in the form of a recommended decision, the staff votes for its acceptance or rejection.

Another school (130 staff members) is beginning the third year of a three-year project to improve communications and broaden the base for decision-making. A system of interdependent committees has been devised. Members are elected by their peers to the committees in some instances and appointed by the administration in others. Some committees have student and community representatives. The functions and responsibilities of all committees are detailed in writing, and all staff members have a copy of the document. This staff has only two full staff meetings in the school year. Both are for information and for as much socializing as possible.

‘Major decisions within the school should be made on the basis of an informed consensus of the professional staff’ is a statement in the document that indicates one of the major thrusts of the project. A strong effort is being made in this large, complex organization to use the resources of all members.

We visited recently another large school (120 staff members) that again demonstrated that a large organization does not necessarily preclude individuals from being influential in decision-making. Several committees of elected and appointed staff members provide opportunities for input from teachers. Any staff member may attend (but not vote at) any committee meeting to reinforce a point of view he has already voiced in a sub-committee or department meeting. This school has monthly staff meetings, which are conducted by a committee of teachers.

The procedures used in the schools we have cited offer opportunities to staff members for personal growth—experience in administration, testing educational philosophy with others, increasing sensitivity and skill in human relationships, and clarifying personal and professional goals.

Committees

The well-run committee can be one of the most valuable tools of any organization. A poorly run committee can easily become a time-consuming and unproductive nuisance. While most committees rate somewhere between, careful planning could easily increase the proportion of successes.

Care should be taken in selecting people for a committee. Interest and willingness to serve are, of course, basic. In addition, a committee needs a person who has the knack of getting to the root of the problem; another who is keen on facts and figures; an idea person or persons — creative thinkers; a person who is good on detail; and someone who has had experience in the field under discussion. These different types are not always different people. The creative thinker may also be an analyst or a factual resource. The mix of capabilities is the important thing.

In its initial stages of life, the responsibility for the kind of meeting a committee enjoys (or tolerates) rests on the shoulders of the designated leader.

There are many things that must be done to start and carry forward its work. Some of the points that follow will seem obvious, but they bear repeating.

1. Clarify the purpose. The organization that creates the committee does this in a general way, but usually some additional work must go into the interpretation of the job to be done. It may be necessary to convert a general assignment into specific parts, or to break down the job into operating segments. This breakdown points out the ways in which the job may be attacked.

2. Visualize the work of the committee in relation to all the other committees in the organization. Often a committee can go only so far until it relates its work to another committee or receives data from other committees. If this condition exists,

identify it at the start.

3. Deadlines stimulate people to get their jobs done. A time schedule shows committee members when each task must be completed.

4. Provide all the available factual material at the first meeting. This would include a copy of the committee's assignment, a list of the names of the others who will serve on the committee, and the proposed time schedule.

5. The first meeting is crucial. Plan it carefully. It tends to establish the mood of the committee and will enable the members to make a good start on the work at hand. Select a time when all members can be present; especially at the first meeting, absenteeism weakens morale.

6. The place of the meeting should be chosen with accessibility to the members in mind. A pleasant atmosphere does much to help people to work effectively — adequate lighting, comfortable temperature, adequate ventilation. The room should be free of distractions. Seating, around a table, should be comfortable but not cosy.

7. Ground rules under which the committee will do its work should be agreed on at the first meeting. There should be agreement on such rules as:

— How many members must be present to constitute a quorum?

— How frequently will the meetings be held?

— How long will they last?

— How should the agenda be prepared?

— How shall decisions be made — majority vote or consensus?

— How shall reports be released?

8. Prepare the agenda before the meeting. The major items for the next meeting can be agreed on at the close of the meeting in session. The members leave with some awareness regarding what they will work on at the next meeting.

9. Create an atmosphere of work. Have the meeting room, pads, pencils, and agenda ready. When the members arrive, get to work.

10. Make use of resources. Factual information is needed as the basis for decisions. Studies, factual summaries, and background reviews help. Sometimes an outside person can bring in needed information — for example, what a similar committee did three years ago.

11. Provide good discussion opportunities. Make sure every idea offered is thoroughly examined before it is accepted or rejected. At the close of every meeting review the progress made and the actions members have agreed to undertake before the next meeting.

12. Keep records of each meeting. This could be the responsibility of one member, but the collaboration of all members should be used in their compilation-so that what is recorded is agreed to be a clear statement of what was decided. All members should be provided with a copy of the records.

14. The committee should make its report to the body to which it is responsible. It will include the following:

— The name of the committee and its membership.

— The name of the body to which the report is submitted.

— The terms of reference of the committee, or a statement of the specific problem on which the report is being made.

— The steps taken by the committee in arriving at the information contained in the report.

— The committee's recommendation.

— The date of the report.

The report is also an invaluable guide to other committees. A lot of work has been done; others should have the benefit of it.

Decision-Making

Most people want to be involved in the decision-making process when the decision is going to affect their lives. This inclination cannot always be satisfied, but we should never stop trying to do so. The Tannenbaum and Schmidt thesis is acceptable so long as the model is known to all members of the group and the designated leader is candid about the position he takes regarding the sharing of the decision-making power. The more he can share this power with the group, the better. Often the group concerned is too large and there is not enough time and patience to involve everyone. It is better to have the group select six to ten trusted members to work on the solution of a problem and return to the group with a recommended decision and the rationale for it.

Much has been written in the social science literature about orderly models of decision-making. Here is one, arranged in a sequence of steps, that we think has merit:

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1. *Stating and Defining the Problem*
The problem as you understand it.
Whose problem?
Why is it a problem? (background)
2. *Clarifying Understanding*
What are the main and related issues?
Does everyone see problem clearly? (restating, correction)
3. *Clarifying Involvement*
How does the problem affect members?
How are the feelings of other people affected?
Is problem within group's power (terms of reference, etc.) to take action?
4. *Developing Appropriate Criteria*
What criteria are appropriate against which to weigh the alternatives?
5. *Developing Alternative Solutions*
Did the leader postpone *testing for feasibility and critical thinking* until all the alternative solutions were listed?
6. *Testing for Feasibility*
Have pros and cons of each solution been tested against appropriate criteria?
7. *Finding Facts and Opinions*
What additional information is required before a decision can be made?
Have all members' ideas and opinions about the issue been considered?
8. *Summarizing*
Has progress toward a decision been reviewed regularly?
Was group clear on how it was proceeding?
9. *Deciding upon a Course of Action*
How was the decision made—by consensus? voting?
10. *Pretesting Commitment to Emerging Solution*
Are group members willing to carry out solution?
Is action responsibility clear?
11. *Evaluation*
Has this step been included in the plans?
12. *Replanning*
This step usually follows evaluation and precedes further action.
Are plans made for this step?

Taking time to define and clarify the

problem is important. When a problem is not understood by all members of the group, time is wasted and human relations difficulties are exaggerated. It helps to have several members restate the problem in their own words.

Before proposals for solution of the problem are offered, criteria for evaluating the appropriateness of the proposals should be agreed on. A criterion is a statement of a condition we hope to satisfy with the decision we make.

Having made a list of criteria, proposals for solution are called for. List them on a blackboard and get as many as you can before you start checking them against the criteria. Don't mix creative thinking with critical thinking. They are incompatible.

The designated leader will have to exercise strong control at this stage of the process. There are action-oriented people in most groups who offer proposals for solution before the criteria for evaluating the proposals are established. These same people are often the competitive ones who want to persuade the group to accept the solution they propose regardless of its merit. Agreeing on criteria first tends to hold off the biased members so that all proposals are objectively evaluated.

It is to be hoped that a decision will be made with unanimous support. If not, we usually say the majority rules. There is danger at this point. We have a tendency to ride over the minority and dismiss their views. But no one knows with certainty that the majority decision will prove to be the right one. The minority, in the light of subsequent experience, might be right. Or the minority, feeling they were abused by the majority, may sabotage the decision when it is put into action. Or they may feel inhibited the next time they are in a group decision-making situation. We can help to reduce these risks by assuring the dissenters that the decision made by the majority will be reevaluated in an appropriate period of time. All members of the group will have more information after the decision has been in action for a while. So, we ask the minority to bear with the decision for the time being. When this procedure is established and all members feel that it can be relied on, the emerging decision is tested vigorously in a safe climate.

When a decision has been made and its implementation procedure agreed to, everyone concerned should receive a written copy of the decision, the action to be taken, who is to do what and when, and the date when the decision will be reviewed.

Discussion Group Meeting

The purpose of a discussion group is to give the members an opportunity to think, to share ideas, and to talk together. The participants join together to explore and increase understanding. The climate should be supportive and friendly. The action is often lively, even vigorous, but not argumentative. G.K. Chesterton said, 'The thing I hate most about an argument is that it interrupts a discussion.'

The size of the group should be considered. It should be large enough to offer considerable variety in experience and opinion but small enough to be intimate and provide the opportunity for everyone to talk. From four to ten members seems to be about right.

Not all discussion groups need to have a designated leader, but generally it is advisable to have one.

In the context of the shared-leadership approach all members of the group share the responsibility for initiating and sustaining discussion. Keep this in mind as we examine the job of the designated leader. In most groups he will be expected to lead off, but once this is done our comments about the leadership in the group apply to all its members.

The group leader's task is to get the cooperative thinking process under way. He opens the discussion, and his opening remarks should accomplish three purposes.

The first purpose is to establish a warm and friendly climate. If the leader talks too long, or is overly formal or dogmatic, the group will get off to a weak start. His remarks should be brief and informal (but not, of course, irrelevant). They should convey the impression that frank and free participation by the members will be encouraged and that the leader has no intention of dominating the discussion or dictating the procedures.

The second purpose of the introductory remarks is to stimulate interest in the topic for discussion. People participate more readily when they are disturbed about something. Any statements that dramatize the topic in concrete, vivid terms will serve the purpose.

The leader's third purpose is to start the members of the group talking together. To do this it is necessary to conclude the opening remarks with a question. Even so, often silence will follow. The silence does not mean the members are not thinking. If no one responds in a few moments, a second question, related to the first, might be asked. These questions should be prepared before the meeting and should not lend themselves to 'yes' or 'no' answers. Sometimes a question can be directed to a specific person in the group. This is risky unless the leader knows this person or has forewarned him. New groups warm up slowly. Patience and the ability to endure a little silence help the leader.

The leader's questions should be clear and concise. There is nothing more bewildering in discussion than long, involved questions with vague meanings. Furthermore, two or three questions should not be rolled into one. (This is an exceedingly common habit, and one that group leaders should learn to overcome.) And questions should be phrased in such a way as to indicate that an answer is sincerely sought. They should not be speeches followed by a question mark!

Whether at the beginning of the discussion or later on, questions are the most vital instruments at a leader's disposal. If it were necessary to sum up all the skills of discussion leadership in one phrase, we would say that a leader must be master of the art of questioning.

If members merely nod their heads, or if someone makes only a brief comment, encouragement to go on might be perceived in such remarks as: 'Won't you carry that idea a little further?' 'Explain a little more what you mean.' 'I can see by your expression you don't agree. How do you see it?' 'You seem to think that is a good idea. Tell us why.' 'You look doubtful. Tell us what's on your mind.'

If the leader or any member paraphrases a member's contribution or summarizes the comments of several members, it is helpful to check with the members of the group in the following way: 'Is this what you had in mind?' 'Am I saying it right?' 'Did I catch your meaning?' 'Have I missed your point in any way?' 'Can we agree on that?'

Another procedure the leader can use following the opening remarks is to ask the group what aspects of the topic they would like to pursue. These, written in the form of questions, are listed on a chalkboard without comment (except where clarification is needed). After a minute or so for contemplation of them, the leader asks for a show of hands to indicate preferences. The leader selects the most popular question and asks its sponsor to lead off the discussion. If two questions vie for popularity, the time available to the group for discussion is divided appropriately.

Sometimes a group wants to have members undertake specific jobs to help it with its proceedings—for example, a recorder, a resource person, or a process observer. Such roles are helpful in discussion or in decision-making groups, but should not be imposed on a group arbitrarily by the leader. Here are some suggestions for the recorder's job:

1. Keep track of such points as the following:
   — points on which members agree or on which formal action is taken,
   — points on which there are differences of opinion among the members,
   — points on which you are not sure how the members feel,
   — points mentioned but not discussed fully, which the group may wish to consider later.
2. Be ready to make a report of group thinking at any time, and to make an inclusive report at the end of the meeting.
3. Ask the members to amend your reports and invite their suggestions for improvements.

Responsibilities primarily of the resource person include the following:

1. Become well informed before the meeting about the problems and interests of the group.
2. Provide, when needed, additional points of view or information gained through wider study, research, and experience in the particular problem area.
3. Point to further sources of information such as specific publications, research reports, or other authorities.
4. Try to prevent the group members from becoming dependent on you and thus block free exchange of ideas among themselves.

The members of a group are usually too busy thinking and talking about the topic under discussion to give direct attention to how well the group is operating. The job of the process observer is to help the group to be more aware of the processes they are using. This will help the members to be more skillful in discussion and in decision-making. The process observer makes a report at the end of the meeting or during the meeting in response to a request from the group or on his own initiative. How and when he will report is decided before the meeting starts. The group may accept or reject his observations. Here are some pointers for this job:

1. Make a note of actions that seem to help or hinder progress.
2. When you report, be brief.
3. Don't try to tell the members what they should have done. Point out what was done, as you saw it, and ask if anyone can think of something that might have been more helpful.
4. Phrase your comments so as not to give offense. Ask questions. For example: 'Is there anything we might do at this point to move us ahead?' 'It seems to me that we got off the track at such and such a point. I wonder why?'
5. Don't take over the designated leader's job and don't let him give his job to you.

Discussion groups are often used as part of a large meeting or a conference session. Usually the audience is sitting on fixed seats and is scattered in the auditorium. This setting makes interaction difficult. When the audience is seated on movable chairs, much can be done to improve the possibilities of interaction. For example, if 100 people are expected to attend, set out only 60 chairs. Have more chairs stacked off to the side so that arrivals can carry them to the group when the original chairs are filled.

The chairs can be arranged beforehand in such a way as to facilitate discussion. Put them in rows but in such a manner that they can easily be rearranged into sets of four. Like this:

Speaker

xx xx xx xx xx xx xx xx
xx xx xx xx xx xx xx xx

xx xx xx xx xx xx xx xx
xx xx xx xx xx xx xx xx

xx xx xx xx xx xx xx xx
xx xx xx xx xx xx xx xx

The people in rows 1, 3, 5, etc., are instructed to turn their chairs around when a small discussion group is needed. These same people can turn their chairs back to the front when the speaker wants to carry on with his speech or to ask the small discussion groups to report. The authors have managed audiences of 200 people with this arrangement.

We have had much to say about the designated leader, but we remind you again that we believe every member in the group shares in the leadership responsibility. To emphasize this position, here are some 'Do's' and 'Don'ts' for the group or committee members.

Do prepare yourself ahead of time by becoming informed about the topic to be discussed at the meeting.
Do your best to be on time.
Do make sure you understand the problem and ask for clarification whenever you are confused or you think the issue is becoming confused.
Do help the leader whenever you can by contributing to the discussion or the process.
Do talk from your own experience and be accurate when reporting information given to you by others.
Do try to keep your opinions and feelings sorted out from knowledge, research, and facts.
Do listen carefully to and show respect for the opinions of others.
Do keep your contributions relevant to the point under discussion.
Do be aware that your own biases and prejudices distort your perception of the real situation.
Do remember that people have feelings, and make your contributions in such a way that others are not hurt.
Do learn to change your position graciously when it is clear that your position is untenable in the light of new data.
Do offer to contribute your time and effort to jobs that need to be done to help the group reach its goal.
Do try to suspend judgment about an issue until you have adequate information.
Do keep things in perspective.
Don't be so concerned with the importance of what you are going to say that you do not listen to others.
Don't take up more than your share of the group's time.
Don't use other members of the group to satisfy your own personal needs for recognition, status, or prestige, or to get release by habitually complaining, becoming anecdotal, or pontificating.
Don't stifle creativity by being 'practical,' 'realistic,' 'down to earth,' or 'frank' too frequently or at the wrong time.
Don't deny a point of view just because you can't see it. Try to find the reasoning behind it. The other person arrived at his point of view by reasoning just as valid as yours—for him.
Don't interrupt when another group member is speaking.
Don't try to place the total responsibility for the success or failure of the meeting on the group leader. You share some of the responsibility.
Don't participate in a dogmatic manner with a tone of finality. It tends to intimidate the more fearful and less aggressive members and to terminate discussion. The group needs the resources of all its members.

We have tried in this article to offer practical suggestions to improve the productivity of meetings. We hope our audience finds this to be so. We hope, also, that we have intrigued leaders and group members to study the literature about meetings in order to increase their skills as participants in them.

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Une Recherche empirique chez les élèves franco-ontariens

Dormer Ellis, OISE
Jacques Beauchemin, Ministere de l'Education

Cet article est un sommaire d'un mémoire qui fut présenté par Mme Dormer Ellis au congrès des Sociétés savantes en juin, 1976.

En Ontario, environ sept pour cent de la population est de langue française. La plupart sont Canadiens de naissance comme l'étaient leurs ascendants. Ils demeurent sur des fermes et dans des villages, des villes et des cités tout près de la province de Québec. On trouve aussi des francophones dans certaines régions du nord de l'Ontario où ils travaillent surtout à l'exploitation des mines et des forêts.

Le Ministère de l'Education reconnaît le droit aux Franco-Ontariens de faire instruire leurs enfants en leur langue maternelle dans leurs propres écoles publiques. Depuis longtemps, il y a en Ontario des écoles élémentaires où tout se passe en français. La culture canadienne a pu survivre et passer d'une génération à l'autre, grâce à ces écoles élémentaires où le personnel et les élèves appartenaient au même groupe ethnique, religieux et linguistique. Cependant, ce n'est qu'en 1968 que le gouvernement ontarien a fondé des écoles secondaires publiques, afin de répondre aux besoins des étudiants franco-ontariens.

Auparavant, les écoles secondaires étaient toutes des institutions anglaises fréquentées par des enfants d'origines ethniques et de religions différentes. Les finissants des écoles élémentaires françaises ne se sentaient pas chez eux dans ces écoles secondaires publiques. En tant que groupe, leur rendement académique était médiocre et le nombre proportionnel de ceux qui abandonnaient leurs études était très élevé. Il y avait cependant des écoles secondaires françaises privées qui étaient dirigées par les communautés religieuses. Ces écoles favorisaient les familles qui avaient les moyens de payer les frais de scolarité et qui désiraient, pour leurs enfants, un cours académique. C'est ainsi, qu'on a formé un élite d'expression française. A part de ce petit groupe, les Franco-Ontariens avaient accès seulement aux écoles secondaires anglaises et leurs écoles élémentaires ne les avaient pas préparés à réussir dans un tel milieu. Il est donc facile à comprendre pourquoi on retrouve tant de Franco-Ontariens dans des occupations qui ne requièrent aucun diplôme d'études au niveau secondaire. Naturellement, on les retrouve aussi au bas de l'échelle dans la hiérarchie des valeurs sociales et économiques.

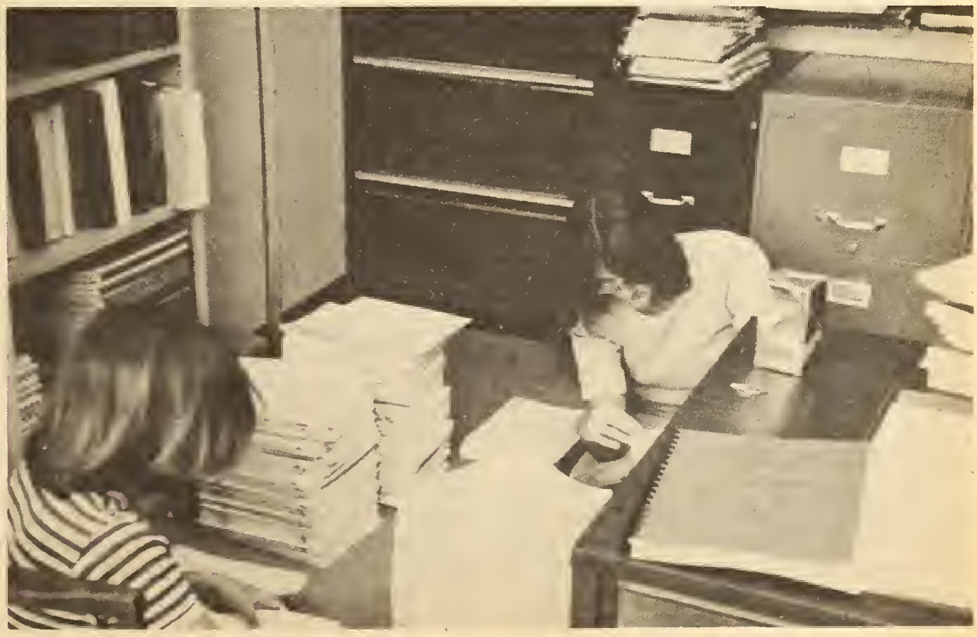
Depuis 1968, il y a en Ontario un réseau d'écoles secondaires publiques où l'enseignement se fait en français. Actuellement, on offre aux jeunes francophones toute la gamme des cours — le cours classique, le cours commercial et le cours en technologie. On s'attend à une évolution pour le Franco-Ontarien ordinaire quant à son degré d'instruction, son rang social et sa condition économique. Bien entendu, les grands changements ne s'opèrent pas de façon instantanée quand il s'agit de réussite scolaire et de modification d'attitude dans le choix d'une carrière.

Depuis janvier 1972, le Ministère de l'Education subventionne un projet de recherche de grande envergure intitulé, 'Etude des caractéristiques et des besoins des élèves franco-ontariens dans le système d'éducation de l'Ontario'. La recherche est sous la direction de madame Dormer Ellis. Jusqu'à son décès en 1975, monsieur Gerald Fleming était codirecteur du projet. La planification de l'étude a été accomplie avec le concours précieux d'un comité consultatif composé d'une dizaine d'éminents éducateurs franco-ontariens. Le but de la recherche est très pratique, celui de recueillir des données au sujet des changements qui se font actuellement dans l'éducation des francophones.

Un aspect important du projet devait être l'évaluation du rendement des élèves en certaines disciplines. L'idéal aurait été d'évaluer le rendement de tous les élèves franco-ontariens, dans toutes les matières et à tous les niveaux. Il est évident que c'était financièrement une impossibilité et, par conséquent, les chercheurs devaient choisir un échantillon typique.

Pour la sélection des écoles qui allaient participer au projet, on a utilisé des techniques d'échantillonnage au hasard en tenant compte des critères suivants: la situation géographique, l'étendue de la communauté et la proportion des familles d'expression française dans la région. On a choisi une centaine d'écoles élémentaires et une quinzaine d'écoles secondaires. Dans chaque école, tous les élèves appartenant aux niveaux designés ont été nommés comme étant les sujets de la recherche. L'excellence de la collaboration qu'ont apportée les éducateurs franco-ontariens dont a bénéficié ce projet, a été mise en évidence par le fait que chacune des écoles choisies a accepté de subir les épreuves de ce programme.

Le comité consultatif avait décidé d'établir des normes provinciales en mathématiques, en sciences sociales, en français comme langue maternelle et en anglais comme langue seconde. Chaque norme devait être basée sur les résultats obtenus par un échantillonnage représentatif de deux mille élèves franco-ontariens au niveau scolaire qu'on allait étudier en faisant ce sondage. Le plan du projet comprenait deux temps principaux pour donner les épreuves. Au cours du dernier



trimestre de l'année scolaire 1972/73, deux mille élèves de la troisième année, deux mille de la sixième année et deux mille de la neuvième année ont subi des tests dans les matières choisies. Un an et demi plus tard — c'est-à-dire, pendant les premiers mois de l'année scolaire 1974/75 — les mêmes groupes d'élèves (qui étaient passés en cinquième, en huitième et en onzième année respectivement) ont subi des tests appropriés à ces nouveaux niveaux. Ainsi, on a pu établir les normes ontariennes à des intervalles d'une année et demie en commençant par la troisième année pour continuer jusqu'à l'onzième année.

Passons maintenant aux tests mêmes. Ce qu'il faut, c'est des tests basés sur le cours d'études tel qu'enseigné dans les écoles ontariennes et dont le vocabulaire utilisé correspond au niveau de lecture française des jeunes Franco-Ontariens qui auront à subir ces tests. Malheureusement, peu de tests, dans n'importe quelle matière, à n'importe quel niveau, répondent à ces conditions. Par conséquent, la toute première tâche des directeurs du projet a été une recherche méthodique et minutieuse de tests de rendement appropriés en mathématiques, en études sociales, en français comme langue maternelle et en anglais comme langue seconde. Après avoir discuté les résultats de cette recherche avec les membres du comité consultatif, les directeurs du projet ont décidé d'utiliser certains tests déjà existants afin d'évaluer le degré de compétence linguistique à plusieurs niveaux. Ils ont décidé aussi de créer une série de tests en mathématiques et en études sociales destinée spécialement aux écoles franco-ontariennes.

Les tests de rendement en français pour lesquels le projet a créé des normes ontariennes ont été obtenus de la Commission des écoles catholiques de Montréal. Les éducateurs franco-ontariens ont été frappés par la qualité de ces tests parce que chaque test a été soigneusement préparé, afin de mesurer non seulement la compréhension d'une lecture mais aussi le vocabulaire, l'orthographe, la grammaire et même la prononciation. On a mesuré le rendement en anglais au moyen des tests Gates-MacGinitie, une série de tests utilisée souvent par les écoles de langue anglaise en Ontario. Chaque test comprend des questions de vocabulaire et de compréhension. Une fois que les chercheurs ont choisi ces séries de tests, l'étape suivante était d'entreprendre des essais dans un petit nombre d'écoles de langue française afin de déterminer quel test parmi chaque série était le mieux adapté aux élèves francophones de chaque année sous évaluation. Bien entendu, les élèves qui ont pris part aux essais préliminaires n'étaient pas les mêmes individus que ceux qui ont été sélectionnés par la méthode d'échantillonnage au hasard pour devenir les sujets sur lesquels on allait établir les normes pour la province. Quelques rapports au sujet du rendement linguistique des jeunes Franco-Ontariens ont été publiés dans la revue *Orbit*.[1] Le projet de recherche a mis à la disposition des directeurs d'école certaines normes pour des tests de rendement en français et en anglais de sorte qu'ils pouvaient, pour la première fois, se rendre compte du progrès de leurs propres enfants en se servant, pour fin de comparaison, le rendement des francophones de la même année scolaire dans toute la province.

Pour l'évaluation du rendement en mathématiques et en études sociales, l'équipe de chercheurs a fallu créer des tests à l'intention des écoles ontariennes pour les élèves d'expression française. Dans une période de trois ans, on a fait huit tests — une série de quatre tests en mathématiques et une série de quatre tests en études sociales — destinés aux élèves des troisième, cinquième, sixième et huitième années. La méthodologie de la construction de ces tests et la participation des instituteurs franco-ontariens à chaque étape ont été décrites dans une revue pédagogique.[2] On a établi les normes provinciales de chaque test. Il n'y a pas de restrictions de droits d'auteur des tests Ellis-Fleming. Après avoir servi les objectifs de ce projet de recherche, ils ont été mis à la disposition de n'importe quel éducateur franco-ontarien qui désirait s'en servir pour ses propres élèves. A cet effet, on a placé une annonce dans *Entre Nous*, une revue pédagogique de langue française. Le secrétariat du projet a été inondé vraiment par les demandes venant des enseignants et des directeurs d'école pour les normes ontariennes et un seul exemplaire de chaque test qu'on pourrait polycopier sur les lieux. Bien sûr, les chercheurs ont éprouvé un réel plaisir en apprenant que cet aspect du projet, l'évaluation du rendement des élèves franco-ontariens, allait servir immédiatement à travers la province.

Un deuxième aspect de la recherche était de connaître les attitudes et les attentes des adultes franco-ontariens en ce qui concerne les écoles secondaires de langue française. Pour des raisons d'ordre économique, on a choisi seulement une région, le nord-est ontarien. Une francophone a été embauchée en 1972 afin d'interviewer des Franco-Ontariens dans les villes de Timmins, Hearst, Kapuskasing, Sudbury, Sturgeon Falls, North Bay et les villages avoisinants. Elle a interviewé des francophones de divers milieux afin de recueillir leurs commentaires sur l'avenir de la francophonie ontarienne et le genre d'éducation qu'ils estimaient le plus apte à assurer aux jeunes un plus grand succès dans la vie. Les résultats de sondage ont été publiés en 1974 dans un rapport intitulé *Une Minorité s'explique*.[3]

Le troisième aspect du projet est celui qui se continue. Il s'agit d'une étude à long terme chez deux mille étudiants qui étaient débutants au niveau secondaire en 1972. L'équipe de chercheurs suivent chaque individu jusqu'à la fin de ses études secondaires en 1977 ou jusqu'à son départ le l'école secondaire. A cause de l'intégration des divers aspects du projet, les sujets de l'étude à long terme sont les deux mille élèves qui étaient en neuvième année dans les quinze écoles secondaires qui ont pris part, en 1973, aux programmes de testing en français, en anglais et en mathématiques. Quand ils étaient en onzième année, ils ont subi un autre test de rendement en français pour établir les normes empiriques de ce niveau. De temps en temps, les sujets de cette recherche à long terme ont subi certains autres tests; par exemple, un test d'intelligence sans apport culturel. En plus, tous les ans, les directeurs des écoles participantes fournissent aux chercheurs quelques renseignements concernant chaque étudiant: le nombre de crédits acquis pendant l'année scolaire, la note moyenne, etc.

Néanmoins, la source principale des données pour cette étude à long terme a été les jeunes eux-mêmes. Quand ils commençaient leurs études au secondaire, ils ont répondu à un questionnaire plutôt long. Les statistiques qu'on a obtenues après l'analyse des réponses ont été publiées.[4] Ce dossier des deux milles débutants aux écoles secondaires de langue française a suscité un grand intérêt parmi les éducateurs francophones. Il démontrait le fait que ces élèves sont bien différents des élèves dans les autres écoles secondaires ontariennes et cela parce que plusieurs facteurs entrent en jeu; par exemple, les niveaux d'instruction atteints par les parents, le nombre d'enfants dans la famille et le genre de travail du père. D'un plus grand intérêt encore, surtout pour les orienteurs professionnels, c'était la documentation du bas niveau des aspirations de tant d'étudiants francophones.[5] Dans le cas des jeunes filles surtout, c'était très prononcé. La pénurie de gens appartenant au même groupe ethnique que les jeunes franco-ontariens pourraient prendre comme modèles rend la tâche de l'orienteur très difficile et très importante dans une école de langue française.

Notes:

1. Tremblay, Armand, et Ellis, Dormer. 'Rendement en français des élèves franco-ontariens'. *Orbit* 19 (octobre 1973). Gauthier, Rhéal, et Ellis, Dormer. 'Le rendement en anglais des élèves franco-ontariens'. *Orbit* 23 (juin 1974).
2. Richards, Gerald, et Ellis, Dormer. 'L'évaluation du rendement des élèves franco-ontariens: d'où viennent les tests?' *Orbit* 22 (avril 1974).
3. Ce document d'une centaine de pages est disponible à l'Institut d'études pédagogiques de l'Ontario, à raison de $4.95 l'exemplaire.
4. Beauchemin, Jacques, et Ellis, Dormer. 'Portrait de deux milliers de débutants aux écoles secondaires'. *Orbit* 26 (février 1975).
5. Knight, Arthur, et Beauchemin, Monique. 'Retrait prématuré des étudiants des écoles secondaires de langue française'. *Orbit* 30 (décembre 1975).

OF MANY THINGS

Students at William Lyon Mackenzie attempting to classify the chemical elements, a puzzle that has recently been published by OISE.

What Makes a Game?

Howard G. Ball
Columbus College, Georgia

In recent years, games—long regarded as purely recreational—have been accepted as valid instructional aids. This is not surprising, since research and demonstration activities have proved that many of them are purposeful and interactive, convey meaningful information, and provide learning experiences not readily available from other sources. But careful evaluation and informed selection on the teacher's part are essential if the games he selects are to accomplish the purpose he has in mind.

The dominant place held so long by monopoly, bingo, scrabble, lotto, and checkers has been increasingly threatened in recent years by a flood of new games designed to promote teacher/child relations and children's team-play. From this massive output teachers are seeking games that instruct as well as amuse, and their search is complicated not only by quantity and variety but also by the claims—valid and otherwise—made by the manufacturers on behalf of their products. Regardless of the types of games or their classifications, those that afford sound, purposeful instruction have three common qualities. They promote social interaction among players; they encourage decision-making and planning; and they provide information on particular topics, issues, or events.

As consumers, we must realize that not all games labeled 'educational' provide meaningful, worthwhile experiences. Games should be interesting and fun to play, but if they are to have a legitimate place in the classroom, they must possess instructional features that complement and enrich our teaching. The following questions are offered as criteria by which teachers may measure the educational worth of games and their suitability to a given setting.

1. Are the objectives of the game clearly stated, and do the instructional guide and other supplementary materials provide sufficient information?
2. Is the game's instructional value sufficient to justify (a) its use in the classroom? (b) its cost?
3. Will it complement the instructional objectives of the unit of study to which it relates?
4. Can it be adapted to the varied learning levels, interests, and skills of the students—including children with special learning needs?
5. Does it present contemporary problems and issues? Is it concerned with real-life situations?
6. Will it encourage player interaction and promote group understanding?
7. Will it involve children in decision-making and/or problem-solving?

8. Does it support the inquiry approach to learning?
9. Does it encourage players to use their entire sensory system?
10. Does its strategy provide a mental and emotional challenge?
11. Will it contribute to (a) vocabulary development? (b) formation of a realistic concept of time—hours, days, and months? (c) understanding of numerical concepts? (d) increased capacity for concentration? (e) development of skills in visual discrimination (such as recognition of signs, symbols, and colors)?
12. Does it encourage (a) self-expression? (b) creativity? (c) use of the imagination?
13. Will it motivate children to explore their social environment more actively?
14. Is it free from negative biases, harmful stereotypes of people or places, and anything that might be offensive to any students?
15. Does it violate any principles or established practices of the school district?
16. Does it make provision for observable behaviors that will permit one to evaluate student learning?
17. Is it sufficiently flexible to be used in activity periods of varying lengths?
18. Is it sufficiently uncomplicated that, after adequate instruction, the children can play without teacher supervision?
19. Can the game be played without the use of expensive equipment not already available in the school?
20. Are all of its parts strong and durable?
21. Can parts be easily replaced if damaged or lost?
22. Is the game colorful and sufficiently attractive to capture the children's attention?
23. Is it presented in compact, portable form that can be handled easily and used with minimum disruption of classroom procedures?
24. From the information provided with the game, can students tell whether they are winning or losing (or, in noncompetitive games, succeeding)?
25. Does the manufacturer have a good reputation in the field of educational games and equipment?
26. Would one be willing to endorse the game publicly?

Answers to the above questions will give the teacher a broad-based assessment of the ability of any game to meet the needs of his students. These criteria provide him with an evaluation that is objective as well as personal. If he replies affirmatively to at least 80% of the questions, the game may be expected to meet his needs and to justify its use in his classroom. If his rating is only slightly below 80%, he may wish to reconsider his answers with a view to determining the significance of the negative replies in the overall situation. In so doing, however, he must not lose sight of the fact that games are valuable teaching aids only if they stimulate the intellectual and emotional growth of the students concerned.

Extra! Extra!

A delayed late edition of *Septem Colles*, dated Dec. XXXI, XIV A.D., recently hit the newsstand at St. Clair Secondary School, Sarnia.

Produced by Joanne Pollock's Year 3 history class, the newspaper combined the encyclopedic immediacy of that medium with months of student research and writing.

The death and deification of Augustus were the main news stories carried by RP wire service. Sports report, advice to the lovelorn, and critical reviews filled fifteen pages and created a vivid impression of Roman life.

A birth announcement welcomed new Roman citizen Gaius Nucerini (born at home), and a notice of the death of Lucius Fabius Scipio included a request that relatives and friends bring torches to his funeral procession. News items, advertising, and feature articles dealt with the daily interests of Romans of all ages.

School newspapers serve many purposes; this one helped to forge ties between modern Ontario and the ancient Roman Empire.

Beyond 'Student' Services

A. R. Wells, Assistant Superintendent
Lambton County Board of Education
Sarnia

As school days end, young graduates encounter many changes. These evolve not only from altered demands on time but from a new legal status. Many adult responsibilities are taken up by the former students for the first time.

To help in this transition, Jim Newell, North Lambton Secondary School, Forest, Ontario, has produced a unique collection of information entitled 'What You Need to Know When You Leave School.'

Addressing itself not only to graduates but to young people leaving school at any stage, the booklet deals with seven major topics. OHIP, unemployment insurance, life insurance, and the implications of reaching legal majority are among the subjects covered.

Lightly and engagingly written, the material is appealing to any reader but invaluable for its intended audience.

Perhaps *Orbit* readers might be stimulated to compile similar material to serve the needs of their own students.

Consumer Report Update

Mark Holmes
Office of Field Development, OISE

Orbit 32 contained a review of intermediate math texts available at that time. A new series became available as the report went to press.

Math Is 1, F. Ebos, B Robinson, and P. Pogue. Nelson, 1975 ($6.95). (Also *Math Is 2*, $6.95).

Presentation — This is a clean, uncluttered, well-designed text, second only to the Gage reviewed previously.

Organization — There is a happy medium between the perhaps too challenging Gage approach and the rather dull approach of the traditional text. There is nothing very new, but what is done is well done.

Contents — This book has some real strengths and no very great weaknesses. Its problem-solving, although limited compared to what is really needed, is by far the best of the texts reviewed. Its metrication, although still lacking in depth and practice, is the least inadequate. As a sound all-round text this is a strong Canadian alternative to the Addison-Wesley.

Rating. The other texts were rated from a low of 0 to a high of 5 on a number of criteria. The rating table is replicated here with the addition of the new Nelson text.

	Gage	Ginn	Nelson (1965)	Holt	Copp-Clark	Dent	Addison	Nelson (1975)
Algebra	5	2	4	4	4	4	4	4
Geometry	3	2	3	3	2	2	4	3
Basics	2	4	3	3	3	1	3	3
Applied Math	3	5	4	2	3	2	3	3
Problem-solving	3	2	2	3	2	2	3	4
Metrication	1	2	–	–	–	–	1	3

Readaway Four to Six

Michael Barnes, Principal
Queen Elizabeth Public School
Kirkland Lake

Last spring we surveyed the pleasure reading interests of 165 children of the junior division in our school. That is the group that the pundits say reads the greatest number of books and provides more writers with jobs than any other. The results were a mixed bag of facts and opinions that should bring joy to some authorities and confound others.

From eleven choices of major book topics the children unerringly chose Mystery as the lead category. Surprise here came in the clear second place of Ghost Stories before Adventure. Humor took fourth place in the interest sweepstakes. But before anyone dusts off his Leacock, he should pause and consider the rash of joke and cartoon books now in vogue.

Respectively placed in the middle category in order of preference were Animal, Sports, Spy, and Western. Dark horse here, of course, was the Spy category in seventh place. There is a dearth of cloak-and-dagger stories for children from 9 to 12 years. Way down in the cellar of junior preference came Science Fiction, Romance, and School stories. So any books in the typewriter with adventure/mystery themes and a dash of ghostly presence have it made.

Current argument that the public library and the school library compete for young readers was not upheld in this survey. Both facilities were actively patronized by more than two-thirds of the respondents. A similar number indicated that they purchase books either regularly or occasionally — no doubt a reference to the Scholastic Book Company's energentic push in the schools.

With all this evidence of interest in reading, a hint of parental concern surfaced. Nineteen percent indicated their parents read to them at home either periodically or on a regular basis. Lucky kids!

Magazines too are widely read by the children. Few indicated a lack of interest in them. Children are not nationalists; Hugh Faulkner's bogies, *Time* and *Reader's Digest,* were highest in the magazine stakes, while competitor *Macleans* settled well down in the cellar. *National Geographic* and its junior counterpart, *World,* came next. *Hockey News* came on strong, but *Cycle and Car* had few takers.

Magazines such as *Owl* and *Highlights* won approval from some of the younger set, and older girls enjoyed *Teen, Young Miss,* and *Chatelaine.* But some magazines that never graced a junior school library have a faithful following. Consider *Argosy, Woman's Day, Legion, Watchtower, Car,* and *Weight Watchers' Guide* as maybe an indication of parental interests. The steady following for the *National Enquirer* might give the Bobbsey Twins faction the shudders.

Newspaper readership is encouraging. Seventy percent read the local newspaper regularly. (Kirkland Lake's *Northern Daily News* has a small regional following, but is hardly known beyond the area.) It was evident that some respondents did not check the masthead too often: one child referred to it as 'the everyday paper' while another was accustomed to 'the one the paper boy delivers.' The *Toronto Star* took the lead among the metropolitan dailies scanned by these young readers. The *Globe and Mail* and *Sun* were left far behind, probably because of poor Northern circulation. Newspaper contents were not surveyed for interests, but one youngster jotted in the margin that murders and road accidents were of special interest.

The children indicated a genuine feeling for libraries as places for study and relaxation. Our own librarian, referred to variously as the teacher, the minder, and the keeper, came in for praise. After the books, highlights were the rug, the comfort (sic), and the availability of the room in other than school hours. The quiet atmosphere was singled out as having merit.

So there you have it. Children in the middle years are reading widely, have as diverse tastes as grown-ups, and know what they like. The country can't be going to the literary dogs after all.

OPSMTF Native Assistance Grants

Ontario Public School Men Teachers' Federation Native Assistance Grants are intended to assist in the development of creative programs that meet the special educational needs of Native Canadian elementary school children. Priority is given to projects benefiting Métis and Non-Status Native citizens.

Teachers or other parties involved in education may obtain application forms from the Committee for International Assistance in Education, OPSMTF, 1260 Bay Street, Toronto, Ontario M5R 2B7. Applications can be made at any time; however, applications will be reviewed by the Committee on November 30, 1976, and February 15, 1977. The deadline should be respected by those making application for financial assistance.

Each request is evaluated on its own merits. When support is given, it is done with the intent and understanding that a project becomes self-supporting. The involvement of native citizens in the planning, execution, and evaluation of the project is considered essential.

Educational projects supported in the previous years have included the purchase of a Cree typewriter, a special outdoor education native crafts program, educational books and audio-visual materials for a native resource center, the purchase of medical supplies and eyeglasses for native students, financial assistance in the preparation and publication of a native resource book for teachers, financial support for the publicity of an Ojibway language course outline, a native arts, crafts, and traditional skills workshop, and specific financial support for projects being carried out for Métis and Non-Status Indians by individual associations in Ontario, including the Ontario Métis & Non-Status Indian Association, Anduhyaun Inc., and the Native Canadian Centre.

Educational Programs That Work

A total of 146 federally funded education programs have now received a 'seal of approval' from the U.S. Department of Health, Education and Welfare (HEW). The programs, described in a new publication, *Educational Programs That Work* (Third Edition), were developed in 39 states and the District of Columbia at a cost of from $150 000 to $1 million each over periods of several years.

'This effort by the federal government to find out which programs are truly effective at the classroom level is the only one of its kind in the nation,' says John K. Hemphill, Director of the Far West Laboratory for Educational Research and Development, San Francisco. 'It is significant,' he says, 'because it allows other school districts to adopt the identified programs with confidence that they do what they say they can. Moreover, school districts can adopt the programs at a fraction of the cost it took to develop them.'

Hemphill says there is ample evidence that school districts want to know about and adopt the successful programs. For example, the U.S. Office of Education (USOE) reports more than 1800 adoptions of 65 HEW-approved exemplary programs over a one-year period.

The USOE figures also show that some 500 000 children, ranging from preschool through high school, are now participating in programs adopted by their districts from the HEW-approved programs.

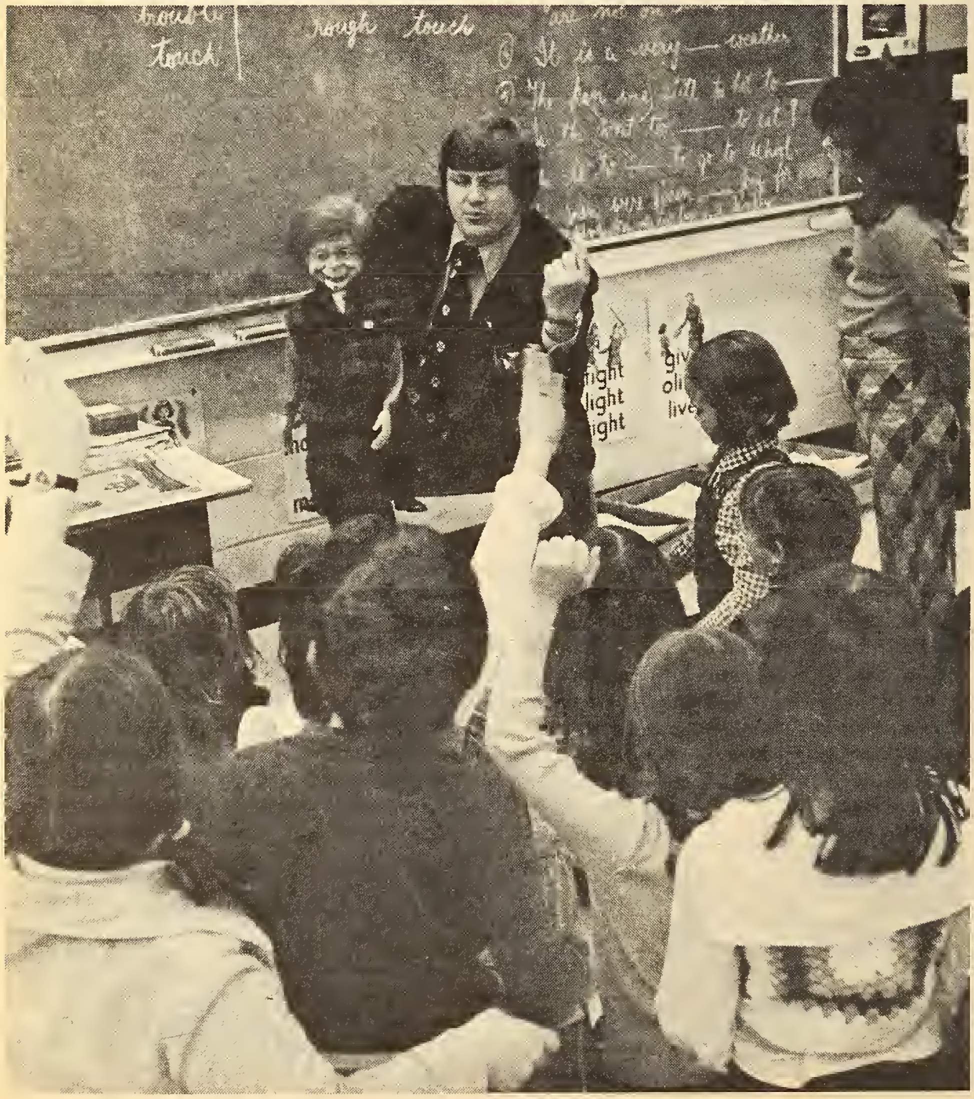
Twenty new programs were approved by HEW during the 1975/76 school year. Hemphill says. 'This means that the staffs of exemplary programs are eager to receive federal approval and to share their approaches with other school districts.' USOE makes dissemination grants to federally approved programs so that they can help other districts adopt their programs. In 1975/76, a total of 65 programs received dissemination grants from USOE.

More than half of the HEW-approved programs directly or indirectly aim at helping students improve their abilities to read, write, and compute. One-fourth of the programs focus on the kinds of students who present the greatest challenges to classroom teachers — the students who are handicapped or who have learning disabilities, those who are exceptionally bright or talented, and those who have a negative attitude toward school. Other programs focus on early childhood education, alternative schools, bilingual and migrant education, career and vocational education, environmental education, health and physical education, arts education, communication skills, and training programs to improve the skills of teachers and administrators.

The new publication contains the names and addresses of all programs, including information on the kinds of students and the kinds of schools that will benefit most from the specific approaches used by the programs. It details the costs per pupil to adopt specific programs as well as the required materials and additional personnel, if any. Evaluation data, showing how well students did as a result of participating in the program, are also included.

The publication provides the names of persons in each state who can help local districts adopt the programs, such as statewide facilitators of federally approved programs, directors of 'compensatory education' programs (Title I of the Elementary and Secondary Education Act), and state Right-to-Read directors. Contact persons and specific information are given for sixteen federally funded education programs that have been chosen by USOE for packaging as Project Information Packages. Six of the packages are now ready for use by school districts. All focus on basic skills.

Copies of *Educational Programs That Work* (Third Edition) are available at $4.95 (U.S.) from the Far West Laboratory for Educational Research and Development, 1855 Folsom Street, San Francisco, California 94103.



'It Hurts to Get Hurt'

Rusty is a winner. Between October 1975 and February 1976 he met and talked to some four thousand Nova Scotia school children, and his tour manager, Gregory Gidney, Safety Education Officer for the Registry of Motor Vehicles, says he is fully booked for the months ahead. Rusty's business is safety; his message, 'It hurts to get hurt.'

All of this may seem very ordinary, but it isn't. Rusty is a red-headed, 24-inch dummy who sports a smart haircut, a natty outfit, and a miniature Nova Scotia flag and safety emblem lapel pin. He works with Mr. Gidney in an ongoing pedestrian safety program sponsored by the Registry of Motor Vehicles. His philosophy is, 'Look first, think ahead, and set a good example.' Rusty reminds children to cross at intersections, to take extra care on icy streets, to be careful around driveways, not to accept rides with strangers, and not to play in the street. Students remember what he tells them, and his mail is filled with sketches of children putting his advice into practice.

The school presentations begin with Rusty introducing two films, *Otto the Auto* and *The Talking Car.* After the showing, he answers the children's questions and discusses pedestrian safety with Mr. Gidney. So far, he has visited schools in Halifax and along the Eastern Shore, but he will be going farther afield in the near future.

Rusty's outstanding succes in teaching students to be safety-conscious pedestrians is understandable. After all, no one wants to get hurt.

Manitoba

Orbit is indebted to the Manitoba Department of Tourism, Recreation and Cultural Affairs for making possible this feature on the Province of Manitoba.

The following materials are available to school principals, teachers, and librarians. Unless otherwise stated, they are free.

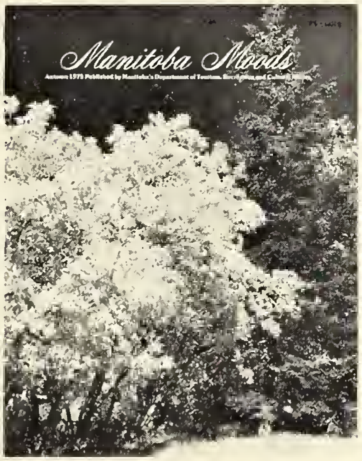
Publications

Please address requests for publications to:

Department of Tourism,
Recreation and Cultural Affairs
Manitoba Archives Building
200 Vaughan Street
Winnipeg, Manitoba R3C 1T5

Manitoba's Legislative Building
A description in word and picture of a seat of government built 'not for present delight nor use alone, but such as our descendants will thank us for.' The Legislative Building, conceived as the focal point of the city of Winnipeg, was officially opened on July 15, 1920 – the fiftieth anniversary of Manitoba's entry into Confederation. Designed by British architect Frank Worthington Simon and built of Tyndall stone (Manitoba limestone), the structure is crowned by 'Golden Boy,' a 13½ foot bronze statue created by French sculptor Charles Gardet. The legacies of ancient civilizations and the already proud heritage of a young land are the subjects of statuary and murals that adorn the interior. Richly illustrated with color photographs, the booklet brings to life a building that does honor not only to the Province of Manitoba but to the whole of Canada.

Manitoba's
Legislative Building



Manitoba Moods

Manitoba Moods
Published quarterly – spring, summer, autumn, and winter – *Manitoba Moods* reflects the many faces of the province. Printed on heavy stock and illustrated in color, the journal has extensive reader appeal. A typical issue deals with such diverse subjects as life in a Hutterite community, the philosophy of the new choreographer of the Royal Winnipeg Ballet, and the making of wild plum jam. A section of mood-creating nature photographs lends a seasonal aura to this very attractive publication. $3 a year (4 issues).

Manitoba Vacation Guide
Prepared as a handbook for the visitor to Manitoba, this publication has potential for much wider use. In addition to the usual directory of accommodation and points of geographic and historic interest, the guide contains lists of museums, research stations, special libraries, hiking trails, interpretive trails (with pamphlets supplied to acquaint the hiker with the plants, wildlife, and geology of the area), ski areas, snowmobile trails, canoe routes, traditional festivals, and special community events. Dividing the province into five regions – northern, western, central, eastern, and the city of Winnipeg – the booklet deals with each individually, using detailed maps to pinpoint places of interest and textual comment to provide pertinent information. In the hands of an imaginative teacher or student, this booklet will serve as resource material for a variety of subjects.

Fishing in Manitoba
A pictorial review of fishing as involvement with nature as well as sport, highlighted by a centerfold of paintings of several popular species of fish. Brief descriptive text accompanies each picture. The booklet shows that excitement is a very real part of the tranquil Manitoba countryside.

Films

Order films well in advance, giving alternative date of showing as well as second choice of film. Please type or print clearly name and address of person to whom film is to be sent. There is no rental charge. Films are sent out by mail only and should be returned the same way. All films are 16 mm, with sound and in color. Note that some films have both a short and a long version.

Address requests to:
Manitoba Government Film
Library
304-200 Vaughn Street
Winnipeg, Manitoba R3C 1T5

Readers in the United States may obtain these films from:
Modern Talking Picture Service
1687 Elmhurst Road
Elk Grove, Illinois 60007, U.S.A.

Everyman's Wilderness (26 min. & 13 min.)
A review of the sights and sounds of nature in northern Manitoba. Fishing and vacation adventures are dramatically presented against a background of lake-country scenery.

Manitoba – Festival Country (27 min. & 13 min.)
Sports and arts drawing from the ethnic and cultural backgrounds of the people of Manitoba highlight an award-winning film. A fast-moving production that exposes the viewer to the traditions of another day.

Assignment Manitoba (25 min.)
Richard Joseph, travel editor of *Esquire*, records on film a trip through Manitoba and his exposure to the varied vacation attractions of the province.

Manitoba in Wintertime (14 min.)
A colorful mosaic of winter. The camera follows children and adults down ski slopes, around ice rinks, and on sleigh rides. But not all the season's recreation is out of doors; the sophisticated glamor of night-life in the city has its place too. Available in either English or French.

Riding the Waves (27 min. & 13 min.)
A leisurely cruise through Winnipeg, 'City of Rivers,' begins a tour of some of Manitoba's 100 000 lakes. A revealing look at the many waterways of our neighboring province.

Fish? . . . Naturally (13½ min.)
Two seasoned anglers share a fishing trip with an eager novice. Shot in the rugged beauty of northern Manitoba's Cranberry Portage, the film shows fishing as both competitive sport and fun-filled recreation. Featuring a remote northern setting, the film highlights the unspoiled wealth of the natural environment.

Manitoba Moods (13½ min.)
A colorful, well-narrated look at Manitoba's parks in their various moods. Original background music.

The Many Faces of Winnipeg (25 min.)
The diversity of ethnic groups in Manitoba's capital provides material for a colorful, fast-moving film that focuses on 'Folklorama' – a festival that perpetuates the treasured and varied traditions of these many groups.

Other References

We are grateful to Dr. John A. Bovey, Provincial Archivist, Province of Manitoba, for preparing this reference list for *Orbit*. To obtain the books, interested readers should get in touch with their local bookstore or public library.

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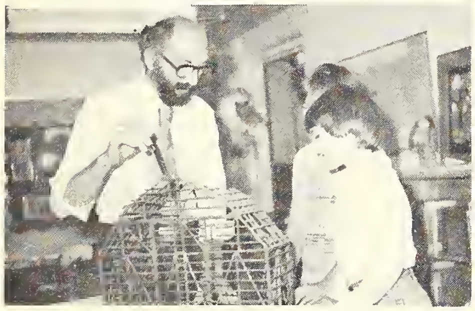
Bloomingdale Public School

Historically speaking, Bloomingdale Public School has been around a long time. The first frame building served as a school and a church from 1833 to 1842. A one-room school was built in 1862 on the present site. In 1919 a two-room school was constructed, and with additions made in 1962 we have the school as we now know it.

Our three-room school continues to be the focal point in this community of 250. The school population comes from the village of Bloomingdale as well as the surrounding farm areas.

With two grades in each of three classrooms (ranging from grades 1 to 6) and with a total enrollment of 85, Bloomingdale Public School is one of the smallest elementary schools in Waterloo County. What it lacks in size, however, it makes up in its unusual qualities.



A relaxed feeling greets you when you first enter this school building. This is not to say that the climate is not productive and educationally challenging – because it is. Because of its small size, the school has an atmosphere of a large caring family. Brothers and sisters are often in the same room. The small energetic staff provide an exciting environment in which each child is known and cared about.

The library resource center was created out of former basement rooms. It now contains over 2000 books and reference items. Carl Dahmer, principal, librarian, and teacher, has strategically placed puppets, stuffed animals, seashells, plants, and miscellaneous memorabilia with the intent of drawing attention to books and interest areas.

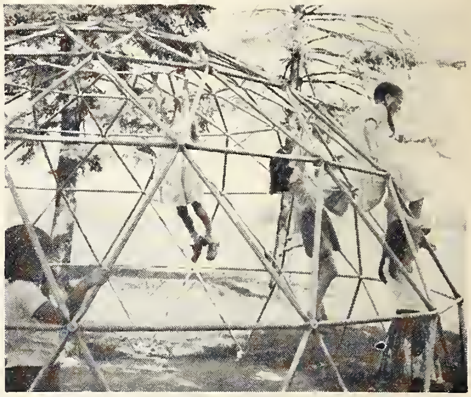
A very active sports program has developed both outside of school and intramurally. The student body is divided into four groups, with grade 6 pupils playing alongside grade 1 pupils. The sports program has stimulated a very healthy competitive spirit within the school.

The community of Bloomingdale, very supportive of all school programs, also uses the school for many different community functions – card parties, strawberry socials, community meetings, and Women's Institute. Even at election time the school is used – as a polling booth.

Activities such as an old-fashioned Christmas Concert are eagerly looked forward to by the community. Every year our pupils walk to a neighbor's maple sugar bush – a convenient and fascinating field trip that enables them to be well acquainted with a local industry. Or classes might walk to the village store or to the trout farm down the road.

In addition, this small-sized school is supported enthusiastically by the board, administration, and consultative staff. Remedial education is available to any pupil, as is speech training. Oral French is taught every day to grade 6 pupils.

In short, this unique school has the wholesome qualities of a previous generation, and yet provides a challenging educational environment necessary for today's inquisitive child.



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